# STATISTICS

## 14 Nema Companies Complete Reports Of Household Sales for May, 1935

The following 14 member companies of the Refrigeration Division of the National Electrical Manufacturers Association (Nema) reported household refrigerator sales and inventories for May, 1935: Apex Elec. & Mfg. Co., Crosley Radio Corp., Frigidaire Corp., General Electric Co., Gibson Electric Refrigerator Corp., Kelvinator Corp., Leonard Refrigeration Co., Norge Corp., Servel, Inc., Stewart-Warner Corp., Sunbeam Electric Mfg. Co., Uniflow Mfg. Co., Universal Cooler Corp., and Westinghouse Electric & Mfg. Co. Member companies not reporting included: Jomoco, Inc., Merchant & Evans Co., and Sparks-Withington Co. The sales of the reporting companies do, however, include units manufactured for the following concerns: Major Appliance Corp., Montgomery Ward & Co., Potter Refrigerator Corp., Sears, Roebuck & Co., and Truscon Steel Co.

**SALES FOR MAY, 1935**

| Lacquer (Exterior) Cabinets Complete | Domestic Quantity | Domestic Value | Canadian Quantity | Canadian Value | Other Foreign Quantity | Other Foreign Value |
|---|---|---|---|---|---|---|
| 1. Chest | 4,532 | $ 225,126 | 180 | $ 8,757 | 178 | $ 9,017 |
| 2. Less than 3.00 cu. ft. | 249 | 12,943 | ..... | ..... | 62 | 3,167 |
| 3. 3 to 3.99 cu. ft. | 11,957 | 680,925 | ..... | ..... | 1,718 | 90,268 |
| 4. 4 to 4.99 cu. ft. | 52,761 | 3,445,959 | 1,285 | 91,157 | 4,919 | 320,721 |
| 5. 5 to 5.99 cu. ft. | 55,428 | 4,292,182 | 616 | 47,286 | 1,111 | 85,112 |
| 6. 6 to 6.99 cu. ft. | 31,862 | 2,824,522 | 223 | 20,277 | 752 | 69,742 |
| 7. 7 to 7.99 cu. ft. | 12,929 | 1,388,903 | 399 | 44,491 | 403 | 42,704 |
| 8. 8 to 9.99 cu. ft. | 2,303 | 261,122 | 28 | 3,078 | 131 | 17,130 |
| 9. 10 to 12.99 cu. ft. | 64 | 12,248 | 2 | 215 | 21 | 4,160 |
| 10. 13 cu. ft. and up | 5 | 1,188 | ..... | ..... | ..... | ..... |
| **11. Total Lacquer** | **172,090** | **13,145,118** | **2,733** | **215,261** | **9,295** | **642,021** |
| **Porcelain (Exterior) Cabinets Complete** | | | | | | |
| 12. Up to 4.99 cu. ft. | 1,943 | 152,173 | 125 | 12,125 | 77 | 6,104 |
| 13. 5 to 5.99 cu. ft. | 6,854 | 604,913 | 15 | 1,441 | 239 | 21,839 |
| 14. 6 to 6.99 cu. ft. | 5,476 | 576,675 | 3 | 433 | 153 | 16,509 |
| 15. 7 to 7.99 cu. ft. | 4,768 | 580,352 | 33 | 4,893 | 221 | 27,115 |
| 16. 8 to 9.99 cu. ft. | 1,821 | 269,115 | 11 | 1,510 | 126 | 19,148 |
| 17. 10 to 12.99 cu. ft. | 656 | 117,938 | 1 | 170 | 56 | 9,930 |
| 18. 13 cu. ft. and up | 325 | 77,720 | ..... | ..... | 44 | 9,958 |
| **19. Total Porcelain** | **21,843** | **2,378,886** | **188** | **20,572** | **916** | **110,603** |
| **20. Total Lines 11 and 19** | **193,933** | **15,524,004** | **2,921** | **235,833** | **10,211** | **752,624** |
| 21. Separate Systems ¼ Hp. or Less | 28,308 | 1,076,028 | 1 | 46 | 1,038 | 50,160 |
| 22. Separate Household Evaporators | 347 | 6,916 | 19 | 418 | 831 | 14,656 |
| **23. Total Lines 20, 21, 22** | **222,588** | ..... | **2,941** | ..... | **12,080** | ..... |
| 24. Condensing Units ¼ Hp. or Less | 893 | 42,014 | 47 | 2,919 | 962 | 55,429 |
| 25. Cabinets—No Systems | 105 | 7,827 | 1 | 114 | 530 | 14,429 |
| **26. Total Household** | ..... | **$16,656,789** | ..... | **$239,330** | ..... | **$887,298** |

**U. S. A. INVENTORIES, MAY, 1935**

| Lacquer (Exterior) Cabinets Complete | WORLD SALES Quantity | WORLD SALES Value | Factory, Branch & Warehouse Quantity | Factory, Branch & Warehouse Value | Distributor Quantity | Distributor Value |
|---|---|---|---|---|---|---|
| 1. Chest | 4,890 | $ 242,900 | 36,627 | $1,846,140 | 1,757 | $ 86,045 |
| 2. Less than 3.00 cu. ft. | 311 | 16,110 | 350 | 21,315 | 388 | 22,826 |
| 3. 3 to 3.99 cu. ft. | 13,675 | 771,193 | 11,828 | 699,447 | 5,288 | 303,190 |
| 4. 4 to 4.99 cu. ft. | 58,965 | 3,857,837 | 71,824 | 4,666,620 | 20,406 | 1,336,375 |
| 5. 5 to 5.99 cu. ft. | 57,155 | 4,424,580 | 56,250 | 4,470,563 | 25,911 | 2,017,526 |
| 6. 6 to 6.99 cu. ft. | 32,837 | 2,914,541 | 38,136 | 3,566,635 | 15,529 | 1,417,255 |
| 7. 7 to 7.99 cu. ft. | 13,731 | 1,476,098 | 32,978 | 3,753,076 | 10,999 | 1,168,223 |
| 8. 8 to 9.99 cu. ft. | 2,462 | 281,330 | 4,447 | 530,968 | 1,181 | 142,726 |
| 9. 10 to 12.99 cu. ft. | 87 | 16,623 | 756 | 137,510 | 100 | 18,652 |
| 10. 13 cu. ft. and up | 5 | 1,188 | 110 | 29,073 | 33 | 8,389 |
| **11. Total Lacquer** | **184,118** | **14,002,400** | **253,306** | **19,721,347** | **95,664*** | ***7,651,189** |
| **Porcelain (Exterior) Cabinets Complete** | | | | | | |
| 12. Up to 4.99 cu. ft. | 2,145 | 170,402 | 5,150 | 403,856 | 1,059 | 84,805 |
| 13. 5 to 5.99 cu. ft. | 7,108 | 628,193 | 6,148 | 559,107 | 4,147 | 382,028 |
| 14. 6 to 6.99 cu. ft. | 5,632 | 593,617 | 5,441 | 567,347 | 4,683 | 518,371 |
| 15. 7 to 7.99 cu. ft. | 5,022 | 612,360 | 13,854 | 1,738,448 | 4,494 | 576,260 |
| 16. 8 to 9.99 cu. ft. | 1,958 | 289,773 | 7,373 | 1,107,217 | 2,265 | 336,551 |
| 17. 10 to 12.99 cu. ft. | 713 | 128,038 | 1,699 | 324,494 | 595 | 115,426 |
| 18. 13 cu. ft. and up | 369 | 87,678 | 1,684 | 395,128 | 365 | 90,265 |
| **19. Total Porcelain** | **22,947** | **2,510,061** | **41,349** | **5,095,597** | **24,909*** | ***2,870,311** |
| **20. Total Lines 11 and 19** | **207,065** | **16,512,461** | **294,655** | **24,816,944** | **120,573*** | ***10,521,500** |
| 21. Separate Systems ¼ Hp. or Less | 29,347 | 1,126,234 | 35,025 | 1,916,843 | ..... | ..... |
| 22. Separate Household Evaporators | 1,197 | 21,990 | 13,767 | 181,265 | 189 | 4,126 |
| **23. Total Lines 20, 21, 22** | **237,609** | ..... | **343,447** | ..... | **120,762*** | ..... |
| 24. Condensing Units ¼ Hp. or Less | 1,902 | 100,362 | 2,314 | 138,680 | 272 | 16,093 |
| 25. Cabinets—No Systems | 636 | 22,370 | 46,242 | 1,684,305 | 36 | 3,444 |
| **26. Total Household** | ..... | **$17,783,417** | ..... | **$28,738,037** | ..... | ***$10,545,163** |

*These totals are not the sum of the breakdown figures, as two companies did not report on individual items.
Note: One company did not supply figures on Factory, Branch, and Warehouse Inventories. Seven companies did not supply figures on Distributors' Inventories.

## Complete Commercial Report for May, 1935

Commercial sales for May, 1935, were reported to the National Electrical Manufacturers Association (Nema) by 18 companies, some of which are not members of the association. These reports cover the sale of units less than 1 hp. in size. Companies reporting are: Baker Ice Machine Co., Brunner Mfg. Co., Carbondale Machine Corp., Carrier Engineering Corp., Crosley Radio Corp., Frigidaire Corp., General Electric Co., Gibson Electric Refrigerator Corp., Kelvinator Corp., Leonard Refrigerator Co., Norge Corp., Phoenix Ice Machine Co., Reliance Refrigerating Machine Co., Servel, Inc., Uniflow Mfg. Co., Universal Cooler Corp., Westinghouse Electric & Mfg. Co., and York Ice Machinery Corp.

**SALES FOR MAY, 1935**

| COMMERCIAL | Domestic Quantity | Domestic Value | Canadian Quantity | Canadian Value | Other Foreign Quantity | Other Foreign Value |
|---|---|---|---|---|---|---|
| 1. Water Coolers Complete | 1,945 | $ 195,511 | 1 | $ 103 | 114 | $ 12,471 |
| 2. Water Coolers Remote | 99 | 6,573 | 5 | 282 | 2 | 123 |
| 3. Ice Cream Cabinets Complete | 1,991 | 253,089 | 157 | 16,872 | 125 | 17,408 |
| 4. Ice Cream Cabinets Remote | 904 | 125,286 | 42 | 4,874 | 19 | 2,391 |
| 5. Beverage Coolers Comp. | 3,463 | 251,958 | 18 | 1,187 | 53 | 4,078 |
| 6. Beverage Coolers Remote. | 148 | 13,895 | 1 | 59 | 4 | 172 |
| **Condensing Units** | | | | | | |
| 7. Less Than ⅓ Hp. | 994 | 54,025 | 9 | 609 | 1,607 | 90,851 |
| 8. ⅓ to ½ Hp. Inc. | 3,846 | 331,687 | 149 | 12,931 | 1,463 | 95,126 |
| 9. Above ½ and Less Than 1 Hp. | 876 | 115,638 | 28 | 3,770 | 101 | 12,829 |
| **10. Total Lines 7, 8, and 9** | **5,716** | ..... | **186** | ..... | **3,171** | ..... |
| **11. Total Lines 1, 3, 5, 10** | **13,115** | ..... | **362** | ..... | **3,463** | ..... |
| 12. Evaporators | 5,474 | 155,093 | 275 | 9,792 | 835 | 29,455 |
| 13. Miscellaneous Cases and Cabinets | 32 | 8,517 | 9 | 1,019 | 5 | 1,262 |
| **14. Total Commercial** | ..... | **$1,511,272** | ..... | **$51,498** | ..... | **$266,166** |

**U. S. A. INVENTORIES MAY, 1935**

| COMMERCIAL | WORLD SALES Quantity | WORLD SALES Value | Factory, Branch & Warehouse Quantity | Factory, Branch & Warehouse Value | Distributor Quantity | Distributor Value |
|---|---|---|---|---|---|---|
| 1. Water Coolers Complete | 2,060 | $ 208,085 | 9,755 | $ 980,861 | 2,714 | $266,687 |
| 2. Water Coolers Remote | 106 | 6,978 | 5,652 | 241,182 | 81 | 5,217 |
| 3. Ice Cream Cabinets Complete | 2,273 | 287,369 | 2,429 | 360,962 | 165 | 21,483 |
| 4. Ice Cream Cabinets Remote | 965 | 132,551 | 3,469 | 472,337 | 297 | 38,851 |
| 5. Beverage Coolers Comp. | 3,534 | 257,223 | 1,778 | 138,167 | 422 | 26,885 |
| 6. Beverage Coolers Remote. | 153 | 14,126 | 1,977 | 118,702 | 175 | 11,065 |
| **Condensing Units** | | | | | | |
| 7. Less Than ⅓ Hp. | 2,610 | 145,485 | 11,470 | 661,357 | 508 | 30,186 |
| 8. ⅓ to ½ Hp. Inc. | 5,458 | 439,744 | 9,346 | 932,616 | 1,675 | 159,784 |
| 9. Above ½ and Less Than 1 Hp. | 1,005 | 132,237 | 3,505 | 476,890 | 632 | 86,554 |
| **10. Total Lines 7, 8, and 9** | **9,073** | ..... | **24,321** | ..... | **2,815** | ..... |
| **11. Total Lines 1, 3, 5, 10** | **16,940** | ..... | **38,283** | ..... | **6,116** | ..... |
| 12. Evaporators | 6,584 | 194,340 | 25,244 | 828,585 | 3,192 | 115,004 |
| 13. Miscellaneous Cases and Cabinets | 46 | 10,798 | 528 | 158,233 | 104 | 32,435 |
| **14. Total Commercial** | ..... | **$1,823,936** | ..... | **$5,369,892** | ..... | **$794,141** |

Note: Three companies did not supply figures on Factory, Branch, and Warehouse Inventories. Nine companies did not supply figures on Distributors' Inventories.

## Sales of Air-Conditioning Equipment Reach New Peak in First Four Months of 1935

The table below shows the value of orders booked by 56 manufacturers of air-conditioning equipment (fans, unit heaters, and air washers) for April, 1935, and compares this total with preceding period. The data was collected by the Bureau of Census, Department of Commerce.

| | 1935 April | 1935 March | VALUE OF ORDERS BOOKED 1934 April | 1933 April | Months (January-April) Total, 4 1935 | Months (January-April) 1934 | Months (January-April) 1933 |
|---|---|---|---|---|---|---|---|
| **(a) Fan Group—Total** | **673,947** | **577,484** | **572,986** | **249,918** | **2,168,985** | **1,617,580** | **857,385** |
| Fans, including bearings, pulleys, or coupings (if furnished): | | | | | | | |
| For public and semi-public buildings | 112,226 | 73,023 | 91,952 | 34,325 | 275,061 | 210,505 | 122,741 |
| For general industrial uses | 228,765 | 201,787 | 207,241 | 70,193 | 790,921 | 648,222 | 270,344 |
| For mechanical draft | 83,275 | 72,252 | 106,626 | 51,662 | 289,672 | 233,163 | 127,482 |
| For jobber stocks and unknown uses | 54,174 | 59,972 | 20,967 | 4,620 | 153,641 | 54,854 | 22,347 |
| Small housed and propeller fans: | | | | | | | |
| Direct connected small housed blowers with motors and control (merchandise motors) | 43,425 | 49,289 | 94,229 | 45,939 | 177,234 | 320,814 | 177,858 |
| Propeller fans, direct connected and belted (for ventilation only) | 88,879 | 67,708 | | | 270,920 | | |
| Driving mechanism for general fan use (not reported above): | | | | | | | |
| Electric motors and controllers* | 43,505 | 37,447 | 47,778 | 39,295 | 168,924 | 133,091 | 120,636 |
| Steam engines* | 1,546 | 2,425 | 2,733 | 1,819 | 7,579 | 10,826 | 7,197 |
| Steam turbines* | 18,152 | 13,581 | 1,460 | 2,065 | 35,093 | 6,105 | 8,780 |
| **(b) Unit Heater Group—Total** | **457,288** | **369,454** | **345,580** | **100,432** | **1,701,277** | **1,314,143** | **481,019** |
| Industrial Type Unit Heaters, including heating element and motors where furnished: | | | | | | | |
| Equipped with blower-type (centrifugal) fans | 74,675 | 48,217 | 182,962 | 39,908 | 263,387 | 739,046 | 225,341 |
| Equipped with propeller-type fans | 111,194 | 132,375 | | | 596,110 | | |
| School Room Type Unit Heaters, including heating element and motors and control where furnished | 138,362 | 109,051 | 75,337 | 25,639 | 473,351 | 243,033 | 122,513 |
| Indirect Heating Surface (not including unit heater surface): | | | | | | | |
| Steel pipe coil type* | 1,749 | 3,534 | 10,904 | 2,314 | 7,040 | 20,697 | 3,682 |
| Cast iron type* | 3,670 | 1,411 | 10,019 | 3,697 | 23,114 | 32,605 | 18,951 |
| Copper or aluminum type* | 127,638 | 74,866 | 64,358 | 28,873 | 338,275 | 278,762 | 110,532 |
| **(c) Air Washer Group—Total** | **229,473** | **163,877** | **282,565** | **85,936** | **695,637** | **621,341** | **258,337** |
| Air washers including pumps and motors and control where furnished | 56,009 | 49,251 | 101,083 | 22,382 | 165,314 | 164,496 | 97,672 |
| Air-Conditioning Units for industrial purposes only (including usual accessories) | 173,464 | 114,626 | 181,482 | 63,554 | 530,323 | 456,845 | 160,665 |
| **Total** | **$1,360,708** | **$1,110,815** | **$1,201,131** | **$436,286** | **$4,565,899** | **$3,553,064** | **$1,596,741** |

*Manufactured or jobbed.

## New York and Illinois Lead State Sales For May, 1935

The following report of sales by 14 manufacturers of household electric refrigerators is a distribution by states of their sales for May, 1935. The companies reporting are listed at the left above.

| States and Territories | Quantity of Household Low Sides |
|---|---|
| Alabama | 3,700 |
| Arizona | 590 |
| Arkansas | 1,411 |
| California | 16,901 |
| Colorado | 1,239 |
| Connecticut | 3,209 |
| Delaware | 422 |
| District of Columbia | 2,283 |
| Florida | 3,104 |
| Georgia | 4,534 |
| Idaho | 1,170 |
| Illinois | 23,993 |
| Indiana | 5,037 |
| Iowa | 3,302 |
| Kansas | 2,191 |
| Kentucky | 2,458 |
| Louisiana | 1,988 |
| Maine | 1,369 |
| Maryland | 3,030 |
| Massachusetts | 10,012 |
| Michigan | 8,341 |
| Minnesota | 3,365 |
| Mississippi | 1,205 |
| Missouri | 4,665 |
| Montana | 1,143 |
| Nebraska | 2,187 |
| Nevada | 324 |
| New Hampshire | 1,003 |
| New Jersey | 10,562 |
| New Mexico | 409 |
| New York | 24,974 |
| North Carolina | 5,652 |
| North Dakota | 815 |
| Ohio | 13,661 |
| Oklahoma | 2,547 |
| Oregon | 2,218 |
| Pennsylvania | 15,791 |
| Rhode Island | 1,141 |
| South Carolina | 2,477 |
| South Dakota | 648 |
| Tennessee | 4,296 |
| Texas | 8,320 |
| Utah | 1,173 |
| Vermont | 599 |
| Virginia | 3,335 |
| Washington | 3,062 |
| West Virginia | 2,668 |
| Wisconsin | 3,710 |
| Wyoming | 354 |
| **Total United States** | **222,588** |
| Canada | 2,941 |
| Other Foreign (Including U. S. Possessions) | 12,080 |
| **Total for World** | **237,609** |

## Missionary Buys Icyball For Use in South India

FORT WAYNE, Ind.—Unusual order filled recently by the W. J. Barth Co., Crosley dealer of this city, was that made for the Rev. G. A. Stetter of Fort Wayne, who purchased a Crosley Icyball refrigerator for service in the mission field of South India.

The Rev. Mr. Stetter selected an Icyball for his refrigerating needs because he does not have access to gas or electricity.

## Refrigerator Exports for February, 1935

| | Electric Household Refrigerators Number | Electric Household Refrigerators Value | Electric Commercial Refrigerators Up to 1 Ton Number | Electric Commercial Refrigerators Up to 1 Ton Value | Parts for Electric Refrigerators Value |
|---|---|---|---|---|---|
| Austria | 25 | $ 2,271 | 6 | $ 992 | $ 519 |
| Belgium | 141 | 10,893 | 84 | 7,292 | 4,821 |
| Czechoslovakia | 1 | 59 | 1 | 183 | 2,092 |
| Denmark | ... | ... | 16 | 1,218 | 1,554 |
| Finland | ... | ... | 3 | 471 | 1,286 |
| France | 195 | 15,021 | 40 | 3,719 | 20,030 |
| Germany | 3 | 260 | ... | ... | 5,517 |
| Greece | 1 | 215 | ... | ... | 56 |
| Irish Free State | 29 | 2,456 | ... | ... | 30 |
| Italy | 48 | 3,826 | 138 | 11,655 | 8,366 |
| Latvia | ... | ... | ... | ... | 67 |
| Netherlands | 52 | 5,373 | 3 | 408 | 5,744 |
| Norway | 43 | 3,599 | 17 | 2,518 | 581 |
| Portugal | ... | ... | 7 | 2,089 | 806 |
| Rumania | 4 | 132 | ... | ... | 31 |
| Spain | 107 | 8,852 | 21 | 2,646 | 6,938 |
| Sweden | 121 | 9,974 | 6 | 758 | 11,879 |
| Switzerland | 20 | 1,589 | ... | ... | 7,433 |
| United Kingdom | 1,367 | 92,034 | 104 | 10,629 | 44,922 |
| Yugoslavia | 1 | 66 | ... | ... | ... |
| Canada | 595 | 31,641 | 45 | 8,003 | 37,988 |
| British Honduras | ... | ... | ... | ... | 40 |
| Costa Rica | 1 | 100 | ... | ... | 4 |
| Guatemala | 9 | 1,056 | ... | ... | 33 |
| Honduras | 16 | 2,312 | 2 | 921 | 69 |
| Nicaragua | 3 | 349 | ... | ... | 35 |
| Panama | 38 | 5,071 | ... | ... | 1,913 |
| Salvador | ... | ... | 3 | 666 | ... |
| Mexico | 222 | 22,596 | 15 | 1,977 | 1,396 |
| Newfoundland and Labrador | 3 | 190 | ... | ... | 1 |
| Bermuda | 9 | 1,258 | 2 | 365 | 443 |
| Barbados | 6 | 527 | ... | ... | 25 |
| Jamaica | 61 | 8,547 | ... | ... | 46 |
| Trinidad and Tobago | 4 | 329 | ... | ... | 84 |
| Other British West Indies | 19 | 1,691 | ... | ... | 81 |
| Cuba | 100 | 10,245 | 46 | 5,025 | 5,692 |
| Dominican Republic | 35 | 3,618 | ... | ... | 612 |
| Netherland West Indies | 42 | 3,895 | 3 | 413 | 46 |
| French West Indies | 5 | 595 | ... | ... | 102 |
| Haiti, Republic of | 3 | 303 | ... | ... | ... |
| Argentina | 1 | 49 | ... | ... | 5,687 |
| Brazil | 433 | 33,565 | 13 | 1,428 | 16,842 |
| Chile | 7 | 487 | ... | ... | 121 |
| Colombia | 61 | 5,792 | 6 | 2,417 | 212 |
| Ecuador | 9 | 1,056 | ... | ... | 52 |
| British Guiana | 3 | 176 | ... | ... | 128 |
| Surinam | 1 | 56 | ... | ... | 23 |
| Peru | 10 | 1,382 | ... | ... | 256 |
| Uruguay | ... | ... | 1 | 94 | 225 |
| Venezuela | 125 | 13,535 | 2 | 389 | 939 |
| British India | 249 | 26,139 | 19 | 3,148 | 9,197 |
| British Malaya | 171 | 17,420 | 3 | 1,100 | 401 |
| Ceylon | 44 | 4,407 | 1 | 303 | 1,212 |
| China | 352 | 35,772 | 3 | 798 | 2,262 |
| Netherland India | 139 | 13,538 | 2 | 522 | 3,076 |
| French Indo-China | 104 | 8,645 | ... | ... | 581 |
| Hong Kong | 26 | 2,437 | 1 | 934 | 23 |
| Japan | 57 | 5,131 | 8 | 1,506 | 7,649 |
| Kwantung | 17 | 700 | ... | ... | ... |
| Palestine | 118 | 8,015 | 2 | 114 | 1,643 |
| Philippine Islands | 32 | 1,527 | ... | ... | 1,203 |
| Siam | 1 | 25 | ... | ... | 13 |
| Syria | 3 | 296 | ... | ... | 25 |
| Turkey | 42 | 5,079 | ... | ... | 446 |
| Other Asia | 6 | 1,488 | ... | ... | 93 |
| Australia | 40 | 1,823 | 1 | 52 | 12,322 |
| British Oceania | 1 | 210 | ... | ... | ... |
| French Oceania | 2 | 122 | ... | ... | 54 |
| New Zealand | 65 | 5,809 | 1 | 248 | 827 |
| Belgian Congo | 13 | 1,684 | ... | ... | 291 |
| British East Africa | 20 | 1,961 | ... | ... | 137 |
| Union of South Africa | 355 | 25,701 | 25 | 2,843 | 6,998 |
| Gold Coast | 28 | 1,936 | 2 | 106 | 84 |
| Nigeria | 1 | 65 | ... | ... | 250 |
| Other British West Africa | ... | ... | ... | ... | 101 |
| Egypt | 56 | 4,795 | 8 | 581 | 1,090 |
| Algeria and Tunisia | 209 | 15,001 | 30 | 3,407 | 4,321 |
| Madagascar | 1 | 202 | ... | ... | 74 |
| Other French Africa | 1 | 71 | ... | ... | 102 |
| Morocco | 19 | 1,476 | ... | ... | 600 |
| Mozambique | 10 | 945 | ... | ... | 112 |
| Other Portugal Africa | 1 | 54 | ... | ... | ... |
| Canary Islands | ... | ... | ... | ... | 235 |
| Other Spanish Africa | 4 | 278 | ... | ... | 3 |
| **Total** | **6,166** | **$499,793** | **690** | **$81,933** | **$251,192** |
| Hawaii | 220 | 23,830 | 1 | 176 | 2,725 |
| Puerto Rico | 72 | 7,849 | 14 | 1,578 | 2,400 |
| Virgin Islands | ... | ... | ... | ... | 149 |

THE NEWSPAPER OF THE INDUSTRY

# ELECTRIC REFRIGERATION NEWS

WRITTEN TO BE READ ON ARRIVAL

Registered U. S. Patent Office

ESTABLISHED 1926. MEMBER AUDIT BUREAU OF CIRCULATIONS. MEMBER ASSOCIATED BUSINESS PAPERS. MEMBER PERIODICAL PUBLISHERS INSTITUTE.

VOL. 15, NO. 13, SERIAL NO. 331
ISSUED EVERY WEEK

Entered as second-class matter Aug. 1, 1927

DETROIT, MICHIGAN, JULY 24, 1935



THREE DOLLARS PER YEAR
TEN CENTS PER COPY



## Retail Sales in Oklahoma Gain In First 5 Mos.

### 18.5% Increase Reported By Local Dealers to Oklahoma Utility

OKLAHOMA CITY—Retail sales of household electric refrigerators in the communities served by the Oklahoma Gas & Electric Co. for the first five months of 1935 amounted to 6,400 units as compared with 5,380 for the same period in 1934, an increase of 18.9 per cent.

Biggest increase in monthly sales as reported by dealers in the various communities to the utility, was in March, during which sales increased 84.7 per cent over March, 1934.

Sales in April, however, showed a slight decrease as compared to the same month the previous year, but rallied in May when a 14.4 per cent increase was shown.

Following is a record of sales by months through May for 1935 and 1934:

| Current Month Sales | 1935 | 1934 | Increase |
|---|---|---|---|
| January | 335 | 277 | 20.9 |
| February | 479 | 395 | 21.2 |
| March | 1,668 | 903 | 84.7 |
| April | 1,798 | 1,952 | 7.8* |
| May | 2,120 | 1,853 | 14.4 |
| **Total** | **6,400** | **5,380** | **18.9** |

*Denotes decrease.

An analysis of the sales by communities shows that the largest increases were made in the smaller towns. This is balanced by the fact, however, that the only decreases suffered were in some of the smaller communities.

The larger communities for the most part had increases that were in line with the general average for all localities reporting.

Following is the record of sales by communities through May, 1935, and May, 1934:

| | Total Five Months 1935 | Total Five Months 1934 | Per Cent Increase |
|---|---|---|---|
| Oklahoma City | 2,516 | 2,210 | 13.8 |
| Norman | 70 | 53 | 32.0 |
| El Reno | 107 | 126 | 15.0* |
| Guthrie | 85 | 110 | 22.7* |
| Shawnee | 651 | 479 | 35.9 |
| Seminole | 261 | 203 | 28.5 |
| Wewoka | 193 | 216 | 10.6* |
| Holdenville | 71 | 39 | 82.0 |
| Enid | 591 | 497 | 18.9 |
| Ardmore | 368 | 347 | 6.0 |
| Ada | 341 | 186 | 83.3 |
| Durant | 143 | 124 | 15.3 |
| Pauls Valley | 91 | 62 | 46.7 |
| Muskogee | 658 | 491 | 34.0 |
| Sapulpa | 64 | 89 | 28.0* |
| Bristow | 78 | 71 | 9.8 |
| Chandler | 31 | 21 | 47.6 |
| Drumright | 81 | 56 | 44.6 |
| **Total** | **6,400** | **5,380** | **18.9** |

*Denotes decrease.

## Knopf Will Sell Lipman Units in Birmingham

BIRMINGHAM, Ala.—General Refrigeration Sales Co. has appointed W. C. Knopf of Birmingham as distributor for Lipman methyl chloride and Freon refrigeration machines. Mr. Knopf was for several years Frigidaire distributor in Birmingham.

## Woodcox to Direct Montgomery Ward Appliance Division

VANCE C. WOODCOX

* * *

DETROIT—Vance C. Woodcox has resigned as director of advertising and sales promotion for Kelvinator Corp. to become manager of the household appliance division of Montgomery Ward & Co.

He succeeds J. S. (Jud) Sayre, who resigned recently to become assistant to the president of the RCA-Victor Division of RCA Mfg. Co.

Mr. Woodcox had been director of Kelvinator's advertising and sales promotion since 1932. He had been sales promotion manager of the company since 1930.

He had been with Kelvinator since 1925, starting in the sales department and becoming, successively, district sales manager, and domestic sales manager, before taking over the job of sales promotion manager. Previous to his connection with Kelvinator, he had been a sales supervisor for Standard Oil Co.

## Three Units Shown At Furniture Show

By George F. Taubeneck

CHICAGO—Although more than 7,000 buyers registered at the two-week 1935 "summer market" of the American Furniture Mart (a new attendance record for such "markets") only three electric refrigeration manufacturers were listed among the exhibitors—Gibson, Norge, and Stewart-Warner.

Ranney Refrigerator Co. had an exhibit of modern ice refrigerators.

Practically all exhibitors reported better sales figures than had been marked up for the "markets" of last January and July—with prices holding firm and moving upward. Higher-priced, styled lines seemed to be in greater demand than at any "market" of the last six years.

"Price appeal is constantly berated as an advertising approach, but dealers keep right on using it because it has paid them to do so," declared Eagle Freshwater, advertising manager, *Detroit Times*, and former furniture editor and advertising man, at the merchandising conference spon-

(*Concluded on Page 2, Column 1*)

## Summer Sales Drive Opened In Milwaukee

### Cooperative Advertising Emphasizes Economy of Electric Refrigeration

MILWAUKEE—Opening gun in a concentrated campaign for late summer refrigeration business was fired by eight leading Milwaukee distributors on July 16, when the first of a series of five cooperative full-page advertisements appeared in the *Milwaukee Journal*.

The advertisements will be run every Tuesday through the remainder of July, carrying into August. It involves an expenditure of approximately $5,000.

The campaign, first cooperative refrigeration advertising ever attempted in this city, is backed by the Wisconsin Radio, Refrigeration, and Appliance Association, of which F. W. Greusel is president and H. L. Ashworth executive secretary.

Participating in it are distributors of Crosley, Fairbanks-Morse, Frigidaire, General Electric, Grunow, Kelvinator, Norge, and Westinghouse electric refrigerators, and the Milwaukee Electric Railway & Light Co., local utility.

Savings, not price, is the theme of the July 16 advertisement. At least 20 per cent saving on food costs through buying at quantity reduction prices, special bargains, and longer food preservation, is possible with an elec-

(*Concluded on Page 3, Column 3*)

## Georgia Power Purchases Unit Air Conditioners For Its Salesrooms

DETROIT—Kelvinator Corp. has just shipped to the Georgia Power Co. at Atlanta the largest single order for self-contained air-conditioning equipment Kelvinator has received from one distribution point. The shipment constituted one complete carload.

The self-contained air-conditioning units are to be installed in the display rooms of the utility throughout the state. Installations will provide the company with operating displays of air-conditioning equipment for demonstration purposes and at the same time air condition the display rooms for the comfort of customers and employees.

## Tennessee Dealer Makes 1000% of Year's Quota

NASHVILLE, Tenn.—With the refrigerator season only about two-thirds over, the Shelbyville Harness Co., Crosley dealer at Shelbyville, Tenn., has already sold 10 times its quota of electric refrigerators for the entire year.

Shelbyville, a town of 5,000 population, with its full share of negroes, was given a quota of 26 Shelvadors for 1935 by Wheless Gambill, Jr., Gambill Distributing Co., Crosley distributor, Nashville. To date Frank Harper, manager of the dealership, reports 260 Shelvadors sold and says the season is still going strong—and sales likewise. In May the Shelbyville Harness Co., with a quota of six Shelvadors for the month, sold 73.

## Mansfield to House Westinghouse Air-Conditioning Dept.

MANSFIELD — Transfer of the Westinghouse air-conditioning department from East Pittsburgh, Pa., to Mansfield, where it becomes a part of the merchandising division, has just been announced by A. E. Allen, vice president in charge of the Westinghouse Electric & Mfg. Co.'s merchandising operations.

This transfer affects all sales, engineering, and manufacturing activities of the air-conditioning department.

Purpose of this change, according to the Westinghouse merchandising executive, is to effect a closer coordination, particularly in the design and manufacture of air-conditioning equipment with the other closely allied products now within the scope of the merchandising division.

Mr. Allen stated that the company's air-conditioning program will be enlarged and expanded. Westinghouse will continue to distribute its air-conditioning products through its present dealer channels, he continued.

Engineering and manufacturing of air-conditioning products will be centered at the East Springfield, Mass., plant. Sales headquarters will be located at the Mansfield plant. S. F. Myers will continue as manager of air-conditioning sales in the refrigeration and air-conditioning department.

## Jersey Utility Sells 1,000 Units in June

NEWARK—Sale of household electric refrigerators by Public Service Electric & Gas Co. of New Jersey reached a new all-time high for the company in June when nearly 1,000 Kelvinators were sold.

The June sales broke the previous high record for a month, which had been established in May of this year.

Sales of Kelvinators in the first half of 1935 were the best on record, the company officials report, exceeding the corresponding six months of 1934 by 21.4 per cent.

Record sales in June were accounted for in part by the elimination of down payments and by an extension of the partial payment plan period from two to three years.

Hudson division made the best showing in Kelvinator sales, reaching 77 per cent of the annual quota of sales in the first six months. All divisions averaged 52.7 per cent of their annual quotas.

## 200 Units Sold on FHA Plan in Safford, Ariz.

WASHINGTON, D. C.—Electric appliance dealers in Safford, Ariz., have sold more than 200 electric refrigerators during the last few months under the modernization credit plan of the Federal Housing Administration, while refrigerator dealers representing the Southern California Gas Co. at Los Angeles recently placed 262 orders for electric refrigerators in one day with the parent company for sale under this plan, FHA officials report.

One dealer sold 46 refrigerators in two months; another sold 50 the first six months of the year. The refrigerator orders placed with the Los Angeles utility, amounting to five carloads, established a record for one day's orders for refrigerators of this type.

## Stricter Control Proposed after Blast in Chicago

### Authorities Exonerate Equipment & Freon From Blame

By George F. Taubeneck

CHICAGO—Following the explosion of a compressor which was to have been part of the air-conditioning system for the Mayfair Grill here, City Hall authorities of this metropolis have come to the conclusion that all installers of refrigeration and air-conditioning systems should be thoroughly examined before licensing.

When this decision is properly confirmed and goes into effect, one of the first theorems which applicants for licensing must know will be:

Never use oxygen to test for leaks. Oxygen and the mineral oil found in compressors unite to form a highly explosive mixture. (All oxygen manufacturers are extremely careful to eradicate all traces of mineral oil from containers and valves before permitting the oxygen to enter.)

Although as yet it has not been possible definitely to assign oxygen-mineral oil combustion as the cause for the explosion Saturday, July 13, which caused the deaths of two men, severely injured six others, and did more than $10,000 worth of damage, nearly all authorities who have investigated the situation agree that it is the only theory which seems supportable.

Gerald Gearon, chief of the Chicago Boiler Inspection Dept., P. J. Murray, his assistant, Dr. A. H. Nuckolls of the Underwriters' Laboratories, W. C. Twomey, secretary of the Chicago Airtemp Corp. (which supplied the equipment), and Tom McKee of the Midwest Engineering & Equipment Co. (Chicago agents for Universal Cooler), unite in exonerating the equipment or the refrigerant (Freon) from blame for the accident.

Neil Brown, proprietor of the Brown Refrigeration Sales & Service Co. (which was testing the system at the time of the explosion) was so badly burned that he was unable to testify at an inquest. He died Sunday, July 21, thus sealing forever the lips of the one man who could have supplied all the facts as to exactly what

(*Concluded on Page 16, Column 1*)

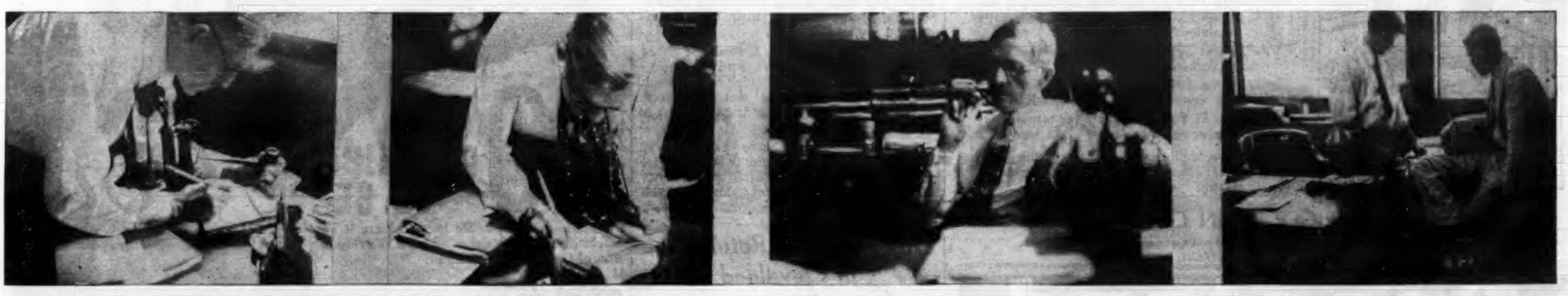
## Reinach Promoted by Kelvinator Corp.

DETROIT—A. H. Reinach has been appointed as staff head in charge of Kelvinator's standard commercial equipment sales, reports J. A. Harlan, manager of the commercial division. F. N. Pattison has been named assistant to Mr. Reinach.

Increases in the sale of Kelvinator standard commercial equipment necessitated the creation of this position, Mr. Harlan states. Mr. Reinach will work with district managers and distributors in the promotion of this equipment.

Mr. Reinach has been with Kelvinator in the commercial division for several years, and has been in the electric refrigeration business since 1924. Mr. Pattison has had experience as a Kelvinator district manager and in commercial applications division.

## Investigators Agree Chicago Explosion Was Not Caused by the Refrigerant



(1, 2, and 3) Dr. A. H. Nuckolls of Underwriters' Laboratories, Chicago, who was interested in getting all facts about the explosion in the Mayfair Grill, which resulted in the deaths of two men and injuries to seven others, did not wish to be quoted on probable causes of the accident, although he exonerated the equipment. (4) P. J. Murray, assistant to Gerald Gearon, chief of the Chicago Boiler Inspection Dept., in his office in Chicago's City Hall, gives careful scrutiny to an application for a permit to install an air-conditioning system.

# Fairbanks-Morsemen Await Selection of Most Useful Invention—and Then They Smile

Just before the Fairbanks-Morse Conservador was chosen 1935's most useful household invention. (1) The awards committee confers before announcing its final decision. (2) Fairbanks-Morseman Ben Menard of Johnson-Menard Co., Chicago distributor, and A. L. Decker of Henri Hurst McDonald, F-M advertising agency, study committee faces to get an inkling of the verdict. (3) Tension increases. Even W. Paul Jones, F-M vice president, bites his thumb and wishes—hard. (4) Victory! Mr. Decker beams, while Mr. Jones mentally prepares his acceptance speech.

## Merchandising Methods Studied by Summer Market of Furniture Men

*(Concluded from Page 1, Column 2)*

sored by the National Retail Furniture Association in conjunction with the "market."

"The best advertisement for any merchant is the kind that gets people into the store. Much advertising is hash—just items and prices mixed together indiscriminately—and people don't all like hash, you know.

"Merchants who 'flop' in their advertising shouldn't blame the newspaper, if they planned the advertisement, merchandised it, wrote it and timed it. Too many merchants wait until the last minute to get their copy ready for print. Better admen, and better art, will make the money spent for newspaper space worth the sum put into it.'

Offers to take in old furniture on a trade-in basis are becoming increasingly prevalent in furniture stores, B. F. McLain, president of the Hart Furniture Co., Dallas, Tex., declared at the conference.

The number of advertisements devoted to this method indicate the success the practice has achieved, he said. Policy of accepting only merchandise which will find a ready market should be watched carefully, and over-valuation of old items is a hazard to be faced, he warned.

"While a standardized list of trade-in values is used in some places, fixed prices on allowances has been difficult to maintain," he continued. "An important factor is the disposition of used furniture. Some outfit customers are willing to buy both new and old items, and in this case it is handy to have them under the same roof; ordinarily, however, it is not advisable to mix displays."

Three types of advertising layout are commonly used by furniture stores, reported Hazel Kraus of Metro Service, a furniture mat producing company.

"These are: bi-symmetric, composite, and stunt. The first is simplest, easiest to read, when not overcrowded, and perhaps best for 'bread-and-butter' advertising," she declared.

"The second has definite design, and the display should be limited as to the number of suites shown. The third is best suited to the highly promotional item."

J. M. Bachrach, president of the National Wholesale Furniture Salesmen's Association, outlined plans for National Furniture Week, and explained how the "try-out" for the event worked out in Pittsburgh this spring.

"Larger cities are spending about 8 per cent of total sales volume per year on advertising; smaller stores are spending from 3 to 5 per cent," stated W. N. Van Horne.

"From 85 to 88 per cent of all advertising appropriations analyzed by our offices—for downtown stores—went to newspapers. To stay out of the papers approaches suicide. Little use is being made of street cars and billboards. Radio and direct mail have a limited part of the remaining 15 per cent, with salaries, mailing charges, and mechanical costs eating up the rest.

"Most stores doing a quarter million dollar business or better find it worth while to employ an advertising manager. Stores need to study their turnover, their gross margins, and departmentalize their available percentages."

Furniture stores should concentrate their efforts on securing a larger share of the *choice* and *profitable* business in the expanding market, George Grabe, controller, John M. Smythe Furniture Co., Chicago, told the National Retail Furniture Association. "Selective Selling" was his keynote.

"Stores should attempt to maintain a net working capital of at least 60 per cent, in relation to annual net sales," Mr. Grabe said.

"In an expanding market, we can afford to select our credit risks a little more carefully, and also by requiring a somewhat greater gross margin.

"Increased cost of merchandise will result in higher inventories, and this can seriously jeopardize the cash position of a store. Current collections on existing accounts are the results of sales made at a lower cost level, and are inadequate to meet current price liabilities and operating needs."

Analysis of major casualties among instalment furniture stores indicates clearly that dividend payments must be based on the cumulative earnings of a representative number of years in a business cycle, Mr. Grabe said, pointing out that these same casualties invariably include institutions which had launched extensive programs of plant additions and improvements.

"We appear to be on the threshold of another rise in the business cycle with the prospect of rapid changes in values," he continued, "and the relative taxing of the finances of every instalment institution, in both of the phases of this cycle. Let us keep our house financially in good shape."

Budgets should be based on an estimated profit and loss statement showing net profit which may reasonably be expected, and also on an estimated balance sheet, showing the financial condition at the end of the period, declared C. S. LaRue, secretary-treasurer of the Sterchi Brothers stores of Knoxville.

"Budgets are valuable because they determine the financial policy of the institution; they show where improvements are possible in the various income elements, and they provide a basis, with profit and loss statements and balance sheets, for obtaining bank loans or continuing existing loans," Mr. LaRue said.

Loyalty and good will of salesmen is an important asset of any furniture company, insisted Louis Etshokin, controller, L. Fish Furniture Co., Chicago. The method of payment must fit the personnel, he said.

"The straight salary basis is the most common method," he explained, "but this method has little to recommend it. If the salesperson employed is successful, he or she is entitled to an increase in salary; but this practice is too often delayed as long as possible.

"The straight salary has the advantage of assuring a steady income regardless of business increase or decrease, but there is no incentive for the employee to make sales volume. The straight commission basis lacks the factor of adequately recompensing workers during a slack period.

"The salary and commission basis eliminates the drawbacks of the first two methods, and combines their advantages. A bonus system may be worked out to pay a certain amount on sales above a certain quota set up for each salesman."

## TVA Activities Enlarged by Bill Passed By House after Bitter Fight

WASHINGTON, D. C.—Advocates of public development of electric power were victorious when the U. S. House of Representatives approved, 278 to 99, the bill for freeing and enlarging the activities of the Tennessee Valley Authority.

Victory for the TVA in the House marked the defeat of a bitterly waged campaign against the corporation, in which the ammunition used was drawn chiefly from Comptroller General McCarl's bill of exceptions presented in his annual audit of TVA's operations.

The measure was adopted in substantially the same form previously passed by the Senate.

The House committee, after violent controversy, had reported out the bill with three chief alterations based largely on the Comptroller General's audit. Their effect, in the view of TVA supporters, would be to "hamstring and hog-tie" the Authority. Each of these amendments was erased by a contrary amendment adopted by the House.

Demanded first by TVA opponents was a requirement that the corporation's expenditures should be subject to the rulings of the Comptroller General.

Supporters of the corporation asserted that this change would make efficient operation impossible, annulling the flexibility which it was the intention of the original act to give to the TVA.

Real issue, therefore, narrowed down to this: Should the TVA be permitted to operate as an independent business would?

The House voted "yes," adding an amendment that hereafter the Comptroller General's audit, when presented to Congress, must be accompanied by the replies which TVA directors make to exceptions noted.

The second demand of TVA opponents was that the corporation should not be permitted to market electricity below cost after July 1, 1938. Without this prohibition, they added, how could it be considered a "yardstick?"

This demand was characterized by TVA supporters as a second absolute barrier to TVA's successful operation.

It was pointed out that practically every business involving a very large capital investment must operate at a loss until its market is built up.

In the case of TVA, the same latitude was said to be necessary, since it began with a large investment and a very small market. Moreover, it is handicapped, they asserted, in expanding its market by such opposition as a private corporation would be free from.

Part of this opposition comes in the form of a court injunction which has prevented sales to municipalities in northeastern Alabama. (This injunction, reported in ELECTRIC REFRIGERATION NEWS, Feb. 27 and March 6, has since been ruled illegal by the U. S. District Court of Appeals, New Orleans.) The present measure would remove the basis for that injunction.

So the TVA, with its market restricted and the Comptroller General insisting that a high rate of depreciation be charged against operations from the first, would find itself compelled to put its charges for current so high that the entire purpose of the enterprise would be defeated. The House voted against erecting that barrier.

The third demand of TVA opponents was that it should not be permitted to build transmission lines competing with those owned by private companies.

This demand, if acceded to, said TVA friends, would effectively insulate the corporation's power stations from their markets, since outlets could be obtained from competing companies only by payment of excessive prices, or by condemnation proceedings that might drag out for a decade.

The House voted that the Authority should not be thus handicapped.

Net result of House action is that TVA is assured of a free hand in its vast program for the production of electricity for use rather than profit, the primary aim being the widest possible extension of electric service at actual cost after the payment of necessary expenses, including replacement costs and such taxes as private corporations pay.

## 4,900 Appliances Sold in 57% of Circus Period

ATLANTA—A total of 4,900 appliance units of all types, or 62 per cent of the campaign quota was sold by salespeople of the Georgia Power Co. in 57 per cent of the campaign period of the "Sales Circus" now being conducted by the utility.

Of the 4,900 units, a total of 3,134 household refrigerators and 390 commercial refrigeration jobs were sold. Other appliances sold were: ranges, 864; water heaters, 445; and water coolers, 67.

Division rankings are as follows: Columbus, 78.7 per cent; Rome, 71.4 per cent; Athens, 64.7 per cent; Augusta, 62.7 per cent; Macon, 59.5 per cent; and Atlanta, 52.7 per cent.

## Truscon Opens Retail Store In Cleveland

CLEVELAND—The Truscon Steel Co., manufacturer of Truscon electric refrigerators, recently opened a retail store in the Union building here.

# Ice Men Told Impartial Survey Shows Electric Refrigeration Users to Be 100% Satisfied

NEW YORK CITY—Two hundred owners of electric refrigerators prefer their present property to the ice boxes they formerly owned, and are glad they made the change, while 568 of 600 ice box owners would rather have mechanical or gas refrigeration than the kind they now have, according to a survey made by a Mrs. Podester, special representative of the *New York American,* and reported to ice manufacturers at the convention of the Eastern States Ice Association.

The survey, termed "a stinging rebuke to the ice industry" by *Iceman's Ice,* publication of the Eastern States Ice Association, was made by Mrs. Podester among 800 women in the middle income group, in order to ascertain the opinion of the average woman in this territory as to the relative merits of ice and mechanical refrigeration.

Among owners of electric refrigerators, of which 200 were covered in the survey, opinion as to the desirability of mechanical refrigeration was unanimous. Asked what led them to buy an electric refrigerator, aside from advertising, 143 answered "bother with ice delivery," 50 "bother with ice pan," 30 "needed new ice box," 22 "food can be kept longer," 15 "ice box did not keep cold enough," and 7 "ice more expensive."

Other reasons cited were that the ice box was too small, the disadvantage of using ice if the family left town for a week-end, and the shortage of ice over Sundays and holidays.

None of the 200 had enough trouble with their electric refrigerator to make them wish they had not made the change. Only 29 of the persons interviewed reported any trouble—11, "noise," and 18, "servicing"—but all 29 said these troubles were as "nothing, compared with the comfort of having a mechanical refrigerator."

Of the 600 women who had ice boxes, 569 said they would rather have an electric or gas refrigerator in its stead. The other 32, the report said, "were older, and felt the ice box was good enough."

Asked why they didn't get a mechanical unit, 203 said it was because they couldn't afford one at present, 254 said they had too good an ice box to consider a change now, and 103 were planning a change in living quarters, after which they expected to do something about it.

"Bother of the ice man" was the principal reason which ice users cited as to why they would prefer a mechanical refrigerator to the one they now own.

Of the 600 women ice users, 507 were buying ice from local dealers, and only 97 from a large company. But 432 of them didn't think they were getting fair weight.

If ice delivery were simplified, and the bother of the ice pan eliminated, 479 women expressed probable willingness to go on using ice, but 121 weren't sure this would satisfy them.

None of the 600 ice users knew of any new or attractive ice boxes being put on the market, most women saying that all they noticed now was cheap ice chests or electric models. None, also, could name any advantages which, in their opinion, ice had over electric refrigeration. Neither did any of them express knowledge of what ice companies are doing to service them.

Only 17 knew that ice cubes were available from ice dealers. Average ice bill was 85 cents per week, with none less than 65 cents, and bills varying from 90 cents to $1.40 weekly.

Complete tabulated data from Mrs. Podester's report follows:

**Answers of 200 Electric Refrigerator Owners**

1) Do you prefer electrical refrigerator to ice-box?—200 yes.

2) What, in addition to advertisements and selling, caused you to decide to purchase?

| | |
|---|---|
| Bother with ice delivery | 43 |
| Ice-box too small | 11 |
| Ice-box did not keep cold enough | 15 |
| Needed new ice-box | 30 |
| Bother with ice-pan | 50 |
| Ice more expensive | 7 |
| Food can be kept longer | 22 |
| Disadvantage if going away for week-end of ice | 14 |
| Never had enough ice over holiday or Sunday | 8 |

3) Do any troubles with electrical refrigeration make you wish you had not made the change?—No 200.

4) Did you think of proper temperature of box before you heard so much about electrical refrigeration?—No 183.

5) When giving a party do you have enough cubes or do you ever have to get ice to use with cubes?

| | |
|---|---|
| Not enough cubes | 139 |
| Got extra piece of ice | 105 |
| Get cubes from neighbor | 5 |

6) Have you ever had trouble with electrical ice-box?—noise, 11; needed service, 18. (These 29 stated that this was nothing as compared with comfort.)

**Replies of 600 Who Have Ice Boxes**

Would you like an electric ice-box or a gas-box?—Yes 568 (32 were older and felt box good enough).

Why don't you get one?

| | |
|---|---|
| Can't afford one now | 203 |
| Have too good an ice-box to consider any change yet | 254 |
| Expect to move—make living arrangement change soon | 133 |

Why do you think you would like an electric box in place of your ice?

| | |
|---|---|
| Bother of ice man | 256 |
| Can store food | 32 |
| Keep box colder | 33 |
| Bother of ice pan | 201 |
| Not able to go away and leave food | 46 |

Do you buy from local dealer or large company?

| | |
|---|---|
| Local dealer | 507 |
| Large company | 93 |

Do you think you get fair weight? No 432. Do you have to tell dealer every day what you want or leave it up to him?

| | |
|---|---|
| Tell every day | 487 |
| Regular order | 50 |
| Up to dealer | 63 |

If ice delivery simplified and bother of ice-pan eliminated, would you be satisfied to continue getting ice? Yes—479; don't know or no—121. Do you know of any new and attractive ice-boxes being brought out? No 600. (Most women stating all they see any more is cheap boxes or electric boxes.) Did you know that you could get ice cubes from ice dealers? No—583, Yes—17.

Do you know of any advantages of ice over electric refrigeration? No 600. In questioning women about ice bill—the average was 85 cents a week with none less than 65 cents and bills varied from 90 cents to $1.40 a week. If your ice was delivered by a reputable company whose salesmen were bonded, would you be willing to permit them to enter, as you do the milkman, thus not having to wait for delivery? Yes 387. Don't know 170. No 43. Do you recall seeing any advertisements telling you advantage of ice refrigeration—what ice companies are doing to service you? No 600.

## Critic on Specialty Selling Story

Two candid camera studies of Ed Shanks, vice president of Dartnell Corp., publisher of books, magazines, and services devoted to salesmanship and sales management, who has proffered critical assistance to Editor George Taubeneck in the preparation of his story on the development of the specialty selling formula by John H. Patterson. Second instalment of the story, now running serially in Electric Refrigeration News, is on page 4 this issue.

## Milwaukee Dealers Inaugurate Cooperative Advertising Campaign to Boost Summer Sales

(*Concluded from Page 1, Column 3*)

tric refrigerator, initial copy says.

"Can't we make you *realize,* Madam, that your food savings actually *will* buy your electric refrigerator?" is the catch-line.

Calling attention to "facts and figures" on the economy possible with electric refrigeration, the advertisement concludes:

"No matter which refrigerator you select from those listed below—whether as an outright cash buy or on convenient terms—it will come into your home as an *investment* that will pay for itself and earn dividends besides!

"Don't let another wasteful day go by without full investigation of how an electric refrigerator pays for itself."

The utility is tying into the campaign with its "free electricity" drive to increase its power load. The advertisement reminds prospective buyers that they will have virtually no operating expense on their refrigerators until October, since the "free electricity" campaign permits the use of any amount of current.

## Borg-Warner Acquires Calumet Steel Co.

CHICAGO HEIGHTS, Ill.—Borg-Warner Corp., Rockford, Ill., has purchased all the capital stock of the Calumet Steel Co. of this city, and is operating it as a separate subsidiary, with Roy C. Ingersoll, Borg-Warner director and head of the Ingersoll Steel & Disc Co., as its president.

Other officers of the organization are F. G. Carrel, former secretary of the Calumet Co., vice president, and Matthew Keck, secretary-treasurer. Directors are Mr. Ingersoll, Mr. Carrel, S. L. Ingersoll, Frank Matthiessen, and C. S. Davis.

## Landers, Frary & Clark Has Series of Service Schools

NEW BRITAIN, Conn.—A series of special sales and service meetings with West Coast distributors of Universal electric refrigerators has recently been completed by Landers, Frary & Clark, manufacturer of Universal electrical appliances.

Distributors cooperating in the meetings included Arizona Hardware Supply Co., Phoenix, Ariz.; California Hardware Co., Los Angeles; Thomson-Diggs Co., Sacramento, Calif.; Seller-Lowengart Co., San Francisco; and M. Seller Co., Portland, Ore.

# PERSONALITIES

By George F. Taubeneck

## Extravagance Which Paid

(*Continued from Page 6, July 17 Issue of* ELECTRIC REFRIGERATION NEWS)

His factory was luxuriously equipped. Its vine-clad walls, mammoth offices, and expensive furniture appalled many business men who visited the place. "It pays," he would answer; and so it did; for stories of the munificence of his business palace spread far and wide, hither and yon, advertising the company and its product to all comers—and, by word of mouth, to those who stayed at home, as well. He could smell a good piece of publicity a mile away.

He loved speed, action, excitement. Fast cars were a hobby. He was on the long-distance telephone as much as Rex Cole is today. Long before Western Union was advising, "Don't write, telegraph," John Patterson was burning up the wires. Perhaps his telegrams weren't so long as those of that other mighty showman and telegrapher, Florenz Ziegfeld, but they were as frequent.

Had he turned his talents to the theater, he might have out-extravaganzaed Ziegfeld, for he took to showmanship as he did to selling, and dramatized everything he touched.

John Patterson's business methods were as unusual and varied—and when lumped together and looked at as a whole, as unfathomable and irreconcilable—as were his personal characteristics.

With men, he was alternately a slave-driver and a teacher; with business policies, he was forever seeking the new and untried; with competition, he was ruthless.

He seldom filled an important company position from outside of his own organization; but otherwise, his method of selecting executives baffled analysis. Many rules he had for choosing executives, but followed almost none of them consistently. He did insist, however, that his executives have the ability—and use it—to make decisions quickly.

All of his men were overpaid. Patterson believed that the more money an employee earned, the better work he would do, and the more reluctant he would be to leave the company. He attracted to his business the smartest of the current crops of young men, and because he paid them more than they could get anywhere else, forced them to put up with his idiosyncracies, and run themselves ragged.

But the fact that an employee might be receiving a large salary gave said hireling no peace of mind insofar as permanence of his job was concerned, for Patterson, as we have said before, had little compunction about firing any man. He once said, "If anybody gets to be indispensable around here, let's fire him."

John D. Rockefeller, Sr., said of him: "John H. Patterson has spared no expense in finding, securing, and utilizing the best and cheapest methods of manufacturing. He has had the best superintendents and workmen, and paid the best wages."

Much of his company "philanthropy," which he sometimes carried to what his stockholders considered ridiculous extremes, was justified in his mind on the theory that it would make his men do better work.

Teaching, he claimed, was the greatest interest of his life. He said, "Business is only teaching." And it is certain that a large portion of American business is still using the Patterson textbook.

That he was a super-trainer of men is evidenced by the number of his former employees now holding responsible positions in the business world's upper strata. Among them are:

Alvan Macauley, president, Packard Motor Car Co.; Col. E. Deeds, chairman of the board, National Cash Register Co.; J. E. Rogers, president, Addressograph-Multigraph Co.; Thos. J. Watson, president, International Business Machines Co.; R. H. Grant, vice president in charge of sales, General Motors Corp.; C. F. Kettering, vice president, General Motors Corp.; Jacob Oswald, president, Roto-Speed Co.; C. E. Steffey, general sales manager, Addressograph-Multigraph Co.

The late Henry Theobald, founder of Toledo Scale Co., and the late H. O. Lauver, treasurer of Burroughs Adding Machine Co., were once employees of Patterson.

* * *

## Birth of Modern Direct Mail

John H. Patterson (a school textbook type of biographer would say) was the first business man to discover and develop a technique by which the force of advertising could be specifically directed and utilized to support and amplify the work of salesmen.

Put simply, he was the first to use direct-mail advertising intelligently. As was the case with most of his new plans, he met with nothing but opposition during his application of the letter-to-the-prospect idea to his business. More than that, his ideas on direct-mail advertising almost wrecked the company financially more than once while the idea was in the process of development.

The first advertising program instituted after the founding of the N.C.R. Co. was in the nature of a direct-mail campaign. Five thousand merchants were chosen as prospects, and were deluged with circulars for 18 successive days. This consistent persistence in employing the mails to promote sales was epoch-making. That's a pretty big term, but its use really isn't ill-advised.

"I had some 5,000 circulars printed, describing the machine and what it would do," said Patterson, discussing the beginning of the campaign. "It was a good circular, but it did not contain a picture of the cash register.

"Having put the envelopes into the mails, we hurriedly hired two extra men to answer the inquiries. We waited, and we might be waiting still, for we did not get a single inquiry. Nobody knew what we were talking about!"

Thus Patterson's first experiment in direct-mail advertising was apparently a flop. The circulars sent to stores "simply fell into a void of silence. There was no response whatever."

When Patterson was confronted with a challenge like this, his fighting spirit was genuinely aroused. He next began the arduous task of making circulars "tell what the register was all about," of gathering endorsements and testimonials, of getting the direct-mail pieces into the hands of owners and past those of indignant clerks who resented statements that the register would solve the problem of clerical dishonesty.

He would dramatize the register! This he proceeded to do by means of pictures, by simple explanations of what it was and how it worked. He did everything he could think of—in the line of printed envisualizations—to pave the way, by mail, for his salesmen. Expenditures for this advertising were considered at that time so extravagant that they drove stockholders and disillusioned employees almost to the verge of wrathful tears.

It was the first time in history, it is believed, that advertising and selling force activity had been coordinated for a single purpose. The idea was booed by business men everywhere, who in those days actually thought that the salesman and the advertisement must be opponents, not friends. Patterson was pronounced "mad." But he went blithely on, carrying his idea to the extreme, spending money, distributing circulars by the millions.

His first effort failed; the second was slow in showing anything but heavy losses, then gradually—slowly—feeble signs of the desired results began to appear. The idea that had been called imbecilic was to become an institution.

Moreover, the stockholders and employees were finally appeased. Sales increased rapidly, and soon the direct-mail advertising expenditure per machine sold came down to a figure considered reasonable by everybody concerned.

So many and so varied were the forms in which direct-mail advertising left the N.C.R. factory that no one has given a definite accounting of them. In his discussion of the N.C.R. advertising campaigns for *Printer's Ink,* former N.C.R. advertising manager E. D. Gibbs states:

"Millions have gone forth on regular company stationery. Others have been issued in expensive and elegant forms resembling wedding invitations. Some have been a direct message from the president or general manager.

"Square envelopes have been tried; long envelopes have had their day. Every shaped envelope excepting a round one has been used to make the appeal *look different.*

"Officers have written the personal letters; agents have tried their skill at composing them; some have been prepared by letter-writing experts; but the best of them all has been the plain common-sense business appeal squarely and honestly shown on the company's regular, everyday business stationery."

Each direct-mail advertisement which left the N.C.R. factory carried with it a return card—the "chickens that were expected to come home to roost." So consistently was this practice of enclosing return cards followed that Gibbs once said:

"I suspect that it is only by an effort that some N.C.R. men keep themselves from putting return cards in the invitations to their own weddings."

Every letter that went out from the N.C.R. plant had, as its major mission, the creation of sufficient interest or curiosity in the mind of the addressee to bring in a reply. Patterson said, "Get the prospect to say something. The man who doesn't reply doesn't buy."

He made no attempt to do a direct selling job in every sentence of his direct-mail literature. As in his sales presentations, he rarely mentioned cash registers purely as store appliances. Rather, *he discussed the storekeeper's business,* showing eventually how the cash register could be an aid to efficiency and a protection for profits. This sales method, making its first appearance here, is a fundamental premise of the specialty selling formula as it exists today.

His mail advertisements were instructive, educational. They told the recipient how he could get more customers, make more sales, attract more attention. They comprised a loose-leaf retailer's handbook of efficiency. Not until actual handling of money was mentioned, did the cash register come up for its share of discussion.

Following are excerpts from one of Mr. Patterson's brochures. They show, probably better than could any description, why N.C.R. mail advertisements were received warmly by store men everywhere. The ads were business builder-uppers for the shopkeeper as well as the N.C.R. Co.

"The way you run your business is your best or your worst advertisement. If you are not getting as many customers as you should get, then you are not doing the proper things to attract trade.

"A business properly run advertises itself and attracts trade. If careless methods are used, you cannot expect the best results. To run your business properly does not require expert advice, but thought and attention.

"Your success depends on what other people think of you and your business methods. In figuring out how you can attract more trade, put yourself in the position of the public and look at yourself and your business as they look at you."

Following this straightforward introduction, the booklet took up, point by point, details of the store-keeper's business which play an important role in successful operations.

"A clean sidewalk, especially on stormy days," it said, "is sure to attract the attention of the passerby, which will naturally draw his attention to the windows. Always make it a point to keep your sidewalk clean.

"Keep your windows clean inside and out. Change your window displays often. Many times customers coming into your store to buy some particular article will have their attention called to some other article in your window, and buy things that they did not originally intend to purchase.

"Use neat, attractive signs in your windows, calling attention to prices and particular bargains or specialties."

Of cleanliness, this N.C.R. mailing piece said, "Clean floors, show cases, and counters attract trade. The surest way to promote cleanliness is to have good light. Light and dirt do not go together. The cheapest things in this world are light, air, and water. Very few people appreciate their importance.

"Proper ventilation is very important. People are often unconscious of good ventilation, but bad ventilation is undesirable and very unhealthful.

"Keep your store well lighted inside as well as out. A well lighted store is always attractive to people passing. When your customers come into your store, they appreciate your showing your goods to advantage.

"Remember that unusual things attract trade and advertise your business. You must not be absurd, but you can do unusual things without doing ridiculous things.

"People like to see employees with clean collars and like to see goods handled by clean hands. Have plenty of soap and water always at hand so that your employees can have facilities for keeping clean."

It was to be expected that the booklet should devote considerable space to advertising by retailers. Every word of it helps to reflect Patterson's advertising philosophy.

"The best advertising in the world," according to the circular "is mouth-to-mouth advertising. Treat your customers so well that they will tell their friends about you and your business and advise them to deal with you. This is the cheapest and best advertising in the world.

"You have often heard it said, 'A satisfied customer is the best advertisement!' This is absolutely true. You know that satisfied customers talk favorably about your business, and dissatisfied customers either do not talk at all, or talk unfavorably."

Still more specific recommendations with regard to advertising followed this advice. Here they are:

"If your business is so situated or so large that you should do newspaper, billboard, street car, or window advertising, you will find that neat, clean looking printed matter is the best investment.

"Remember that your competitor can buy the same space in the same newspaper that you can. Whether your advertisement will be more attractive and bring you more business than his, depends entirely on what you say in the space you buy, and how you say it.

"Simplicity is the most important thing to emphasize in giving instructions to a printer or newspaper as to how your advertisement should appear. Don't allow several different kinds of type rules around your advertisement, or decorations of any kind, unless they have something to do with what you are talking about.

"Don't crowd your advertisement. Don't think that because you are paying for space you have to fill it all up. What you want is to get your advertisement read—oftentimes the more white space and the more simplicity, the quicker people will notice and read it.

"If you are advertising bargains, price is the thing to emphasize. If you are advertising regular goods at regular prices, the thing to talk is quality. Always emphasize service, mentioning the careful attention customers get from your employees, prompt delivery of goods purchased, freedom from mistakes, etc.

"Be specific. Tell why your goods are good goods. Don't make claims that are not true. Straightforwardness and simplicity will attract people quicker than so-called originality. Some advertisements are failures because they are original."

The letters and mailing pieces contained something retailers could use. As such they created respect and confidence in N.C.R. Co. And subtly, by indirection, they created in the minds of prospects the desire to own a National Cash Register.

* * *

## Birth of Testimonial Advertising

John Patterson's bulldog stubbornness in clinging to a concept until it yelled "uncle" is probably one big reason why testimonial advertising has come to be such an important factor in business promotion today. For the notion of converting the old testimonial prayer meeting idea into a business promotional method was the direct result of Patterson's notable "flop" when he first bombarded the thousands of defenseless retailers with his 18-day barrage of direct-mail advertising.

As soon as Patterson came to the dismal realization that his 5,000 circulars had failed to arouse any traceable interest in cash registers, he set out to find whatever he could in the line of successful advertising methods which might be applied to his business.

At the time the old strategist was reaching this decision, the only manufacturers who were utilizing testimonial advertising were the patent medicine companies. And they were using it successfully. Why couldn't N.C.R.?

Forthwith, a list of N.C.R. users was compiled. Then by letter and personal interviews, Patterson worked feverishly to secure endorsements and testimonials, and stories of individual experience which might help convince prospects.

These greatly desired "kind words" were far from easy to get. Many users were not overly pleased with their machines, and others had nothing special to report. The discovery of this dissatisfaction was, as might be expected, turned into an asset by Patterson. It gave him the opportunity of making the users satisfied, of changing knockers into boosters.

And, surely if not rapidly, he accumulated a really impressive collection of good-will letters and signed statements. These were to become the basis for a direct-mail campaign—several of them, in fact—which really did get results.

Patterson had an idea, too, that testimonials from his own men would help other agents, as shown by the fact that he frequently published letters from the field men in *The N.C.R.*—of which we shall speak presently.

* * *

## Birth of the House Organ

This early experience in direct-mail advertising—because its sharp failure set his schizoidic mind working in so many different directions—was the forerunner of several business innovations. Among them, the first house organ—*The Blackboard.* It was published on regular dates, and was made to replace some of the circulars previously distributed among the sales force and prospective customers.

The name of the publication was later changed to *The Hustler,* and finally became known as *The N.C.R.* It was an effort to apply the principles of continuity and regularity to direct mail, to get prospects in the habit of *looking forward* to its arrival, rather than saying: "What? Another of these infernal circulars?"

In its early years, the paper was sent only to prospects, was filled with sales-building suggestions for such prospects, and always contained a return card which read: "I am interested in learning more about a cash register suitable for this business. Please send further particulars. It is understood that I am under no obligation to purchase."

John Patterson turned on all the heat of his steam-under-pressure enthusiasm and ingenuity in developing this house organ. Every means he could devise was used to interest readers and to get the N.C.R. message across.

After a time a "Clerk's Corner" made its appearance in the paper, written flatteringly, and containing suggestions as to how clerks might make themselves more valuable to their employers, and better their stations in life.

This was a deft gesture, intended, of course, to enlist the goodwill of clerks. These fellows had carried a grudge against the N.C.R. from the beginning, inasmuch as one of the selling points for the new machine had been that it stopped dishonesty on the part of clerks. The new feature was so enthusiastically received that it is still a part of the publication to this day.

In the process of its growth, the whole conception, purpose, and tenor of the house organ was changed. From a direct-mail piece to prospects it evolved into a builder of efficiency and *esprit de corps* among Patterson's own men. Its circulation among prospective buyers eventually was cut off, and its content was given over to material of interest to N.C.R. agents. It was when this change was made that the sheet became known as *The N.C.R.*

Crowther, in his biography of Patterson, says of the latter, "He wanted to be constantly in touch with all of the agents. He believed that the progress of business depends upon the interchange of information among those in business, and he wanted to establish not only an easy method of communication with the agents, but also a forum in which the agents could tell how and why they made their sales."

First issue of the publication, after it became *The N. C. R.,* gave the following outline of its purpose:

"In place of sending out circulars to agents, we will issue every two weeks a small paper devoted to the interests of all connected with this company, and to be distributed only to its agents.

"Its principal object will be to distribute information and serve as a medium for asking and answering questions among agents. The first copies will be rather insignificant, but we trust not uninteresting.

"While we prefer to publish the names of contributors, we will not do so if the agents desire to sign anonymously.

"We would be pleased to know the manner of selling adopted by different agents, what they think their strongest points; points to avoid as well as points to make.

"This paper is especially to assist agents, and we trust they will not only take an interest in it, but contribute largely to it."

Among the features of the house organ were a "Hints to Storekeepers" column, and a "Window Display" section. These sections were designed to be clipped by salesmen and stuffed in their pockets, so that they could pass on the ideas contained therein to prospects and users. Frequently Mr. Patterson used the paper to report interesting experiences encountered on his trips to agencies.

(*To Be Continued in the Next Issue*)

## What This Story Is All About

On this page is the second instalment of the editor's story on the Development of the Specialty Selling Formula by John H. Patterson, founder of the National Cash Register Co.

This study of the origins of such integral features of modern appliance distribution as the sales convention, sales contest, sales manual, sales quota, guaranteed territory, field supervision, "using the user" plans, direct-mail campaigns, house organs, testimonial advertising, and "enlisting the wives" is designed to give salesmen an authentic background on—and better understanding of—modern specialty selling methods.

Readers of this serial story who knew John Patterson are invited to submit anecdotes about Patterson and his methods—incidents which might be illustrative of any of the material they may read herein. These anecdotes will be incorporated into the general story, with full credit given to those who send them in to us.

# Sales Idea of the Week

By V. E. Vining, Director of Department Store Sales, Westinghouse Electric & Mfg. Co.

"Old Man Steve" Boreman was the laziest man in Blackcreek Township.

His farm was down the pike a couple of miles from ours. His Laziness was no secret. Whenever you see two farmers leaning up against a rail-fence chewing wheat-straws they were probably discussing "Steve."

"Steve" was so darned lazy he had even spent good money for a—"Ridin'-plow."

'Felt himself too good to walk behind a plow like other hard-workin', God-fearin' farmers—HE had to RIDE.

And more—

He had a patent corn-planter—and a patent "drill" for wheat—and a "Cultivator" and a gadget that cut up fodder and put it in one of these new-fangled Silos.

He didn't hardly do any work himself at all.

His wife even—had a machine to do her washin' and another one that separated the cream from the milk,—so they said. The whole family was lazy.

And—

He had notions about such things as "crop rotation" and fancy "boughten" fertilizer.

He even subscribed to an agricultural paper and believed some of the things he read in it—written, of course, by city slickers to fool us farmers. It was beyond conceivin'.

But—the thing that disturbed us most about Steve was his INFERNAL LUCK.

Everybody knew what would happen to him eventually,—but it never did. Year after year—come hell or high water—Steve raised the most corn to the acre—the most wheat to the acre—he sold more butter per cow—his hogs weighed more and his horses brought better prices,—

Such *luck* was almost discouraging.

Of course my memories of Steve are those of a kid, but as I've grown older I've wondered—and,

I'll bet if Steve had been in your business and mine, his same methods would have sold ANYTHING—

—From peas to penthouses.

## Sacramento Dealers Exhibit in Theater

SACRAMENTO, Calif.—A refrigerator exposition, arranged through the cooperation of local appliance dealers and the manager of the Fox Senator theater, was held in the foyer and rotunda of the playhouse the week of July 7.

The cooperative showing, providing the housewife with a panoramic view of modern refrigeration equipment without the necessity of having to go from one dealer's store to another, was held in the theater because the latter boasts one of the largest air-conditioning plants on the Pacific Coast, involving an investment of $65,000.

The real economy of modern electric refrigeration was a keynote of the exposition. In their presentations, exhibitors also stressed the convenience of purchasing refrigerators and other home appliances under Federal Housing Act loans.

## Crosley Introduces New Line of Accessories For Refrigerators

CINCINNATI—A new line of accessories for the Crosley electric refrigerator—a "Tray-Set," water coolers, and rubber ice trays—has just been introduced by Crosley Radio Corp.

The Tray-Set consists of a "Shelva-Crisper" for vegetables, chilling salads, fruit dishes, candy, sea foods, storing ice cubes, etc.; a "Stora-Tray" for fruits, such as grapefruit, oranges, bunches of grapes, etc.; and a flat bar supporting shelf.

These accessories are made of porcelain enamel with chromium hardware.

Each tray set, fitting the model for which it was designed, completely occupies the space at the bottom of the refrigerator.

The water cooler is a glass container with approximately one gallon capacity.

To facilitate cleaning it has a large glass covered opening in the top and rounded corners.

The cooler is available in two models, the only difference between the two being the type of faucet.



## C. I. T. Will Finance Sales of 12,000 RCA-Victor Radio Dealers

NEW YORK CITY—Commercial Investment Trust, Inc. (CIT) has consummated an exclusive agreement with the RCA-Victor division of the Radio Corp. of America, under which the complete facilities of C.I.T.'s more than 150 branch offices throughout the country will be made available to 12,000 RCA-Victor distributors and dealers.

The new finance plan will be offered to the public with the introduction of the new RCA-Victor line of radios and the RCA-Victor all-metal tubes some time in August.

## Orders of G-E Co. Show Increase in 6 Months

SCHENECTADY—Orders received by General Electric Co. during the first six months of 1935 amounted to $104,542,946, compared with $92,154,642 for the first six months last year, an increase of 133 per cent, President Gerard Swope stated last week.

Sales billed during the first six months of 1935 amounted to $94,546,273.80, compared with $80,983,093.60 during the corresponding period last year, an increase of 17 per cent.

Profit available for dividends on the common stock for the first six months of this year was $11,541,428.78, compared with $8,175,557.22 for the first six months of last year. This profit is equivalent to 40 cents a share for the first six months of 1935 and 28 cents a share for the first six months of 1934 on 28,845,927 shares outstanding in both periods.

Mr. Swope pointed out that last year two dividends of 15 cents a share each were paid on the special stock out of the earnings of the six months' period while for this year there is no such deduction from earnings, as the final payment made upon retirement of the special stock on April 15 was provided for last year. This is equivalent to approximately 4 cents a share of common stock for the six months.

## Ault Joins Staff of Briggs Plumbing Division

DETROIT—A. S. Ault, formerly ceramic control engineer for the General Electric Co. at Erie, Pa., and with the Frigidaire Corp. at Dayton, has been appointed control engineer in charge of ceramics in the new plumbing ware division of the Briggs Mfg. Co.

## Dealers in Alabama Win in Fight for Lower License Tax

BIRMINGHAM, Ala.—After a six weeks' fight, the Alabama Electric Refrigeration Bureau and the Birmingham Furniture Dealers Association have succeeded in getting the privilege tax on the sale of electrical appliances out to within one-fourth of that originally contained in the new state revenue bill which has now been passed by the legislature and dispatched to the governor for his signature.

The measure as passed provides a tax of $30 per year on the sale of electrical refrigerators, ranges, and water heaters in a city of 100,000 or over; $20 in cities of 50,000 to 100,000; $10 in cities of 10,000 to 50,000 and $5 for all under 10,000. The bill as originally drawn woud have levied a $100 tax on stores in the bigger cities, with a graduated scale of $75, $50, and $25 on stores in smaller towns.

Ira J. Randall, secretary-manager of the furniture and electrical dealers association, appearing before legislative committees argued that a prohibitive tax as proposed was contrary to the policy of President Roosevelt who wants to make appliances cheap and available for all.

He also pointed out that most dealers now pay other heavy taxes.

## Wilks Distributing Moves Detroit Office

DETROIT—Wilks Distributing Co., Michigan distributor of Sparton radios and refrigerators, recently moved its Detroit branch to the Grindley Arcade Building, 4484 Cass Ave., where its offices are on the second floor.

## S. California Utility's Campaign Combats Gas Competition

SAN FRANCISCO—Southern California Edison Co. is paving the way for increased dealer sales of electric refrigerators and other household appliances with a program of cooperative advertising, stressing the low cost of operation of electrical appliances on a per day basis, and the fact that using an electric water heater brings lowest power rates to the customer.

Electric refrigerator advertising is aimed to meet gas refrigerator competition. Gas refrigeration claims of low operating cost, silence, and modernity are being met by electric refrigeration features such as the absence of flames, the absence of plumbing (meaning it can be put into operation conveniently and quickly), and operating economy.

## Fox Co. Buys Plant of Davis Welding Co.

CINCINNATI—Fox Co., manufacturer of name plates for electric refrigerators, has purchased the Davis Welding Co. plant in this city.

Plans for additions to the plant, drawn up by John J. Brown, architect, include a one-story office at one end of the plant, and a 50-ft. building extension at the opposite end.

Fox Co. will occupy the new building Sept. 1.

Every operation in the manufacture of Fox products is conducted in the plant, from the making of original designs, blue-prints, dies and tools, to the forging, stamping. assembling, polishing, plating, vitreous enameling, lacquering, and finishing.

## Grunow Distributors' Field Men Compete In 'G-Man' Contest

CHICAGO—A campaign to develop more "G-Men"—"G," in this case, meaning Grunow-Men — has been started among its distributors' field salesmen by General Household Utilities Co.

Jobbers' salesmen become "G-Men" by franchising every primary and secondary city in their territories with Grunow refrigerator and radio dealers. Bonuses are given salesmen for lining up dealers in these cities.

In addition, Grunow "G-Men" are privileged to wear the "G-Ring," classifying them as quota-fillers and as "tops" in salesmanship in the Grunow national organization.

Distributors are being furnished charts on which to list their field men, the "open" cities which they franchise, number of wired homes, and the yearly sales potential, forecast and actual, in these areas. The chart was designed and copyrighted by J. J. Davin, Grunow's sales promotion manager.

## Shield Co. Opens Branch In El Paso, Texas

EL PASO, Tex.—The Shield Co., Inc., Crosley distributor with headquarters in Fort Worth, recently opened a branch in El Paso to distribute Crosley refrigerators and Crosley radios in this territory. A. S. Douglas is in charge of the branch.

Appointment of the Colonial Furniture Co., as retail dealer for this line, was one of Mr. Douglas' first acts. This store will advertise Crosley products by an amateur radio broadcast over station KTSM each noon.

# AIR CONDITIONING

## Florist's Installation Keeps Flowers Fresh, Patrons Comfortable

CHICAGO—Flowers require careful control of moisture and temperature to preserve their freshness. The George Wittbold Co.'s new flower shop in the building at Michigan Ave. and Ontario St. here has extended the comforts of air conditioning to its products as well as its patrons.

A centrally controlled system was designed for the store. The equipment is located on a platform suspended from the ceiling in a room adjoining the sales space, with the exception of the refrigerating machine, which is in the basement.

Three tons of refrigeration were required for cooling purposes. The system is designed to maintain an indoor temperature 15° below the outside in extreme weather, circulating air at a rate of 2,300 c.f.m.

In the flower storage box in the basement, as well as in the display case on the first floor, the temperature and humidity best for flowers is maintained. This equipment is designed for a temperature of 48° F., but 55° F. is about the usual temperature for flower storage. Relative humidity is kept at about 80 per cent.

Flowers must have more humidity than is found in the air in heated interiors during cold weather, and must be kept cool during summer months to retain their freshness, the florist explains.

## N. J. Public Service To Air Condition 4 Branch Offices

NEWARK — Year-'round air-conditioning equipment is to be installed in the Camden, Elizabeth, Englewood, and Orange commercial offices of the Public Service Electric & Gas Co. of New Jersey.

All systems to be in operation next month) will be installed under the supervision of the electrical engineering department of the company. Conditioned air will be distributed throughout the buildings, including the main sales floors.

Feature of the apparatus will be a new method of controlling the temperature of conditioned air in relation to outside weather conditions. As a result of this method, known as "compensated temperature control," the inside temperature will be so regulated that persons entering or leaving these offices will not be conscious of a sharp difference in temperature.

Equipment to be installed in the Orange office will be furnished by Westinghouse Electric & Mfg. Co. The refrigeration unit for cooling and dehumidifying the air will have a cooling capacity equal to approximately 75 tons of ice per day. Electric motors will furnish power for the operation of the machinery. An addition to the first floor will be made to house the air-conditioning equipment.

The refrigeration unit for the Elizabeth office will be built by Carrier Engineering Corp. and will have a cooling effect equal to 40 tons of ice per day. Installation at the office is to be made by the Blocker Air-Conditioning Corp.

The Englewood equipment will be furnished by York Ice Machinery Corp. and will have a cooling capacity of approximately 20 tons of ice per day. The Camden office will use equipment manufactured by the General Electric Co. which will provide a cooling effect equal to about 87½ tons of ice per day.

An air-conditioning system has been in operation in the Public Service Terminal sales floor at Newark for the past two years.

## Pine Cones Described As Model Recorders Of Humidity Change

LONDON, England—Engineers developing modern methods of air conditioning have been able to find for their instruments nothing better than Nature's age-old invention, the pine cone, C. L. Burdick said in an address before the Royal Society of Arts here recently.

The leaflike scales which make up a pine cone remain tightly closed until the cone is ripe, after which they open widely. This is part of Nature's plan to protect the seeds until they are mature, Mr. Burdick said.

These seeds are formed between the leaf, like scales of the cone. When the seeds are ripe, the fibers of these scales become extremely sensitive to humidity changes, pulling the scales open when the atmospheric conditions are right for the growth of the seeds.

Air-conditioning systems need some similar contrivance which will respond accurately to the amount of moisture in the air, Mr. Burdick said.

Instruments have been devised to do this by comparing the temperature shown by an ordinary thermometer, the bulb of which is kept wet so that it is cooled when dry air evaporates the water, but Mr. Burdick said they had found the best device is a simpler instrument, made from the fibers of a pine cone.

This fiber expands and contracts with changes in humidity about three times more than any other known material, he said.

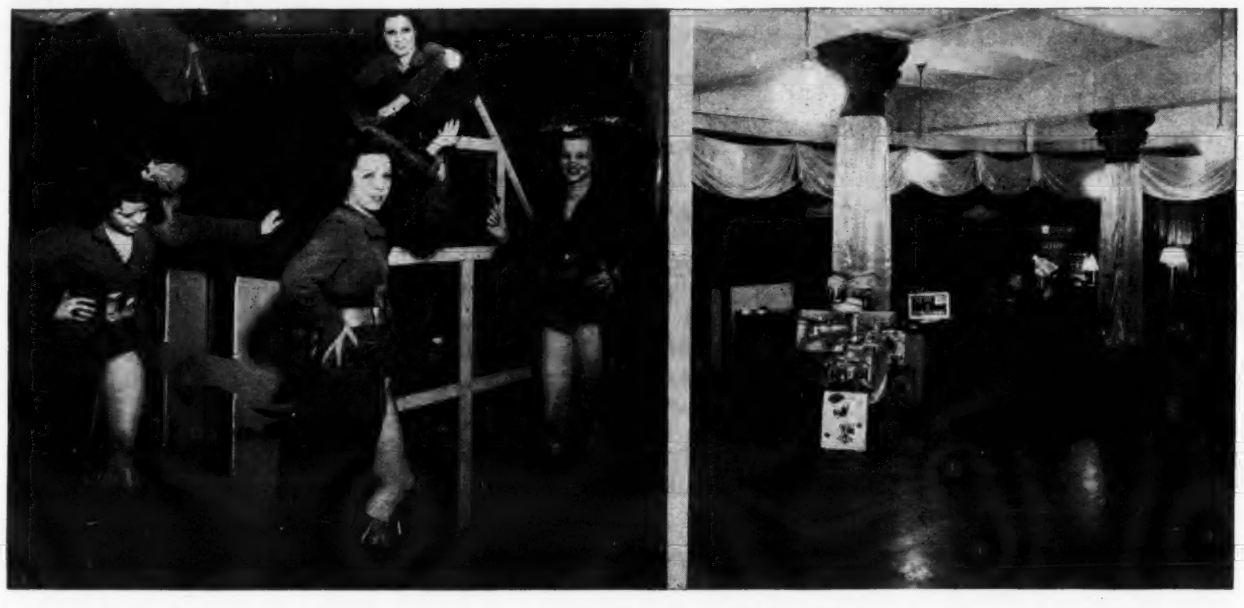
## Buffalo Forge Booklet Gives Unit Ratings

BUFFALO—Buffalo Forge Co. of this city has just issued a new bulletin which includes a complete showing and listing of the company's various types of cooling and air-conditioning units.

Units illustrated and explained include suspended unit coolers, floor units, floor type unit coolers, flat suspended unit coolers, floor unit using brine sprays, central system conditioning cabinets.

Illustrations show details of each piece of apparatus and complete ratings and dimension tables are incorporated. Information on the refrigerant used, proper methods of application, and places where each unit is suitable is given.

## Pirate Girls Invade Cincinnati's Air-Cooling Exhibit



(Left) Showgirls from the Shubert theater in Cincinnati inspect the miniature air-conditioned home exhibited at the Cincinnati Air-Conditioning Exposition, now in progress. (Right) One corner of the exposition, the display booths in this section showing (from left to right) Ilg, Servel, and Westinghouse equipment.

## Canadian Market for Air Conditioning Is Explained by Consul

TORONTO, Ont., Can.—A demand for air-conditioning equipment in the larger cities of Canada will increase if the equipment already installed proves satisfactory, reports U. S. Consul Damon D. Woods, stationed here.

Due to the relatively short summers and long cold winters, Mr. Woods points out, the Canadian demand for air-conditioning apparatus is likely to be along the lines of humidification and purification rather than cooling.

For several years the largest motion picture theater in Toronto has been air conditioned with full mechanical refrigeration equipment. The cost of the refrigeration unit has prevented other theaters from making such an installation, but five of them recently set up water cooling systems, using cool water from Lake Ontario.

Other installations in this city have been made in hotel taverns, better class stores, restaurants, offices, and residences.

Complete "central systems" are slow in adoption, says Mr. Woods. However, there is considerable Canadian demand for "unit" air conditioners.

## New Commercial Fans Introduced by G-E

SCHENECTADY—Three new commercial air-circulating fans designed for use in stores, restaurants, and taverns, and one domestic attic-ventilating fan have been announced by General Electric's merchandise department as additions to the G-E fan line. All are pedestal type and three are adjustable for elevation.

Two of the air circulators, one two-speed and the other single-speed, are similar in appearance. Both are equipped with 24-inch blades capable of powerful air delivery. Telescoping steel columns are adjustable in height from five feet six inches to eight feet six inches.

The 14-inch air circulator is a single speed type, similar in construction to the 24-inch fans, with the new G-E broad, curved blades of light weight sheet aluminum.

The attic ventilator is identical with the 14-inch fan, except that its 32-inch pedestal is not adjustable.

## Plymco Offers Filter Of Rope Fibers

NORTH PLYMOUTH, Mass.—Plymouth Cordage Co., with offices here and in Welland, Canada, has placed on the market the Plymco air filter, of the throw-away type.

Filtering medium used in the Plymco is composed of flexible rope fibers, light weight, odorless, and non-corrosive.

High dust-holding capacity is claimed for the filter, because of the characteristics of the fiber filler, combined with the viscous, semi-solid adhesive with which it is treated.

The fibers are arranged in graduated layers, the intake layer being fire-resistant. From the intake side, each successive layer is finer than the one preceding it, distributing the impurities throughout the filter according to the size of the particles.

On the exhaust side, fibers are packed closest of all, to resist passage of finer particles such as pollen, dust, and bacteria. By thus distributing the cleaning action throughout the filter, longer life is assured, its makers assert.

## Air-Conditioning Equipment Demonstrated At Cincinnati's First Cooling Show

CINCINNATI—Home-owners, merchants, and manufacturers are being given a first-hand view of the practical advantages of air conditioning at the first annual Air Conditioning Exposition, being sponsored by the air-conditioning division of the Cincinnati Electrical Association in cooperation with the Cincinnati *Times-Star*.

Opened June 20, the exposition will be continued through Aug. 15. Hours are from 10 a. m. to 5:30 p. m., daily except Sunday.

First display of its kind here, the air-conditioning show is featured further by the fact that visitors are given a chance to see how the systems work. All exhibits are in full operation, as well as in full view, all during exhibition hours. In addition to mechanically operated systems, the City Ice & Fuel Co. is displaying cooling systems utilizing ice.

The 15 firms sponsoring the event have reported an increasing interest on the part of the buying public in the products which are on display. Although started before the advent of warm weather here, interest in the show, exhibitors say, has been high ever since its opening, and has already resulted in a number of sales.

Largest single sale was an $1,800 unit for a large local residence, made through B. & J. Jacobs Co., distributor for Bryant Heater Co. products.

Chief advantage of the showing, in the view of those participating, is that it eliminates the necessity of "shopping around," and at the same time permits prospective users of air-conditioning equipment to study and compare one manufacturer's product with another's, while both of them are set up and operating. The cool comfort of the exhibition room, too, is another magnet in drawing patronage and comment.

Exhibitors share equally in the expense of the project—rent, light, decorations, and electric power. No tabulation is being kept of the number of persons who visit the show. Compilation of prospects is being left to the initiative of the dealer.

One of the principal attention-getters at the exposition is a small model of an air-conditioned house, open on one end so visitors can see how it operates. Although not truly air conditioned (the house is equipped with an Ilg attic fan rather than a conditioning system), it illustrates the principle of ventilation.

In charge of the show is a committee headed by Eugene P. Zachman, manager of the Cincinnati Electrical Association, and including E. A. Carsey, Kirk & Blum Mfg. Co.; David Kraus, Harten-Knodel Distributing Co.; and Louis Grabensteder, Union Gas & Electric Co.

Exhibitors include Bertke Electric Co., Inc., Bimel Refrigeration Co., Bryant Heater Co., W. D. Callan Co., Carrier Engineering Corp., City Ice & Fuel Co. (conditioner using ice), Commercial Refrigeration Co., Frigidaire Corp., Griffith Distributing Co., Harten-Knodel Distributing Co., Ilg Electric Ventilating Co., B. & J. Jacobs Co., Kirk & Blum Mfg. Co., Servel, Inc., and York Ice Machinery Corp.

## Kellogg to Distribute G-E Conditioners

UTICA, N. Y.—Charles C. Kellogg & Sons Co., 107-year-old building supply company here, will represent the air-conditioning department of the General Electric Co. here.

The Utica franchise was formerly held by A. Wayne Merriam, Inc., which has relinquished its retail activities to handle wholesale appliances exclusively. The Kellogg organization has taken over the entire air-conditioning personnel, and the main display room of the Merriam company. R. H. Fish, formerly air-conditioning manager for Merriam, will continue in that capacity for Kellogg & Sons.

# Survey Shows Improved Health & Efficiency Justify Installation Of Conditioning Equipment

PHILADELPHIA—Improvement in the health and efficiency of employees is sufficient to justify economically the installation of air conditioning in almost every type of business, concludes a survey on the progress of air conditioning completed last month by the Philadelphia Electric Co.

The wide diversity of recent applications of air conditioning by the country's large railroads as well as merchants in almost every line of business is apparent when it is realized that approximately 50,000 kwh. in air-conditioning load was added to public utility lines in 1934, says the survey.

Probable growth to be expected in air conditioning during the next 10 years, as estimated by the *Wall Street Journal*, would take the dollar volume from $20,000,000, the 1934 figure, to $320,000,000 in 1944, or approximately 800,000 kwh. in that year alone. Estimates for 1935 are 100,000 kwh. additional load, or a dollar volume of $40,000,000.

### Experiences of Railroads

Railroads were among the pioneers in the use of air conditioning. Diners equipped for comfort cooling were placed in operation during the summer of 1930 by the Baltimore & Ohio in the east, the Katy Lines in the south, and the Santa Fe in the west.

So successful were these installations that in the summer of 1931 the B & O placed two completely air-conditioned trains in operation between New York City and Washington, D. C. In 1932, the company operated 82 air-conditioned cars, and in 1933 increased the fleet to 162 cars.

### Would Be First to Capitalize

"Our business is railroading," said B & O President Daniel Willard in a recent interview, "but from our experience with air conditioning and its appeal to the public, plus some observation of what air conditioning has done for movie theaters, restaurants, certain process industries, and so on, we believe that air conditioning will play a dramatic and important part in our business development of the future.

"Certainly, if I were a business executive in any other line, I would want to inform myself fully as to what air conditioning had to offer my type of business. And I would want to be the first in my line to capitalize on it."

### Improved Efficiency

Statements by executives tell of marked improvements in the health and efficiency of their employees due to air conditioning. "We are convinced that health and efficiency of our employees has shown a decided improvement," says M. M. Davidson, chief engineer, Northern Trust Co., Chicago.

Dr. W. J. McConnell of the Metropolitan Insurance Co., New York City, and J. J. Falvey of the Chicago Title & Trust Co., are among others who have credited air conditioning with increasing employee health and efficiency.

Within the past few years air conditioning has been installed in several new office buildings, most outstanding of which are the Philadelphia Saving Fund Society in Philadelphia, and Rockefeller Center, New York City. Existing buildings, faced with obsolescence before their normal time, were forced to adopt air conditioning to meet this competition.

Two recent installations were reported to show that air conditioning is essentially a low-cost convenience.

Twenty-three floors of the American Bank Building, New Orleans, were conditioned in 1933, to serve 105,000 sq. ft. of rentable area and 17,500 sq. ft. of banking space at a cost of $90,000, or $0.735 per sq. ft. Similarly, a building in Phoenix, Ariz., the Heard Office Building, was equipped with a system supplying 60,000 sq. ft. of rentable space at a cost of $43,000, or $0.72 per sq. ft.

### Cost Data on Two Jobs

Generalizing on the basis of cost data for the two installations, an average of $0.73 per sq. ft. of rentable space, the article gives the annual owning and operating cost of air conditioning in large buildings as less than 15 cents per sq. ft., or about 20 per cent of the installation cost.

This additional cost is met in one of two ways, it is pointed out—either the building management absorbs it on the assumption of a higher percentage of occupancy, or it is passed on to the tenant as increased rental.

Revenue from air-conditioned basement space is increased 50 per cent, and from other air-conditioned space from 10 to 35 per cent, says M. S. Snyder, vice president of the Milam Building, San Antonio, Tex. Analysis of the records from air-conditioned offices in Philadelphia showed that minor illness caused 75 per cent of the total employee absence. Air conditioning reduced this figure 45.4 per cent.

### Savings Due to Time Lost

Applied to the average number of days missed per employee, estimated at 5.25, and evaluated at $5 per employee per day, this represents a potential saving of $11.90 per employee per year. Assuming 75 sq. ft. of office space per employee, and estimating owning and operating costs of air conditioning at 15 cents per sq. ft., the cost per employee per year would be $11.25—indicating a saving of 65 cents per employee per year when air conditioning is used.

The Philadelphia Electric Co. has made several studies in an effort to evaluate the benefits which air conditioning brings. First of these studies was in the Philadelphia plant of the American Tobacco Co., where a year-around system was installed.

### Smaller Labor Turnover

Under normal conditions, an average of 50 girls per day for 75 days would be able to work only a half-day, leaving at noon. Further, due to discomfort, many girls would quit, to obtain work at summer resorts.

After air conditioning was installed, lost-time was reduced from 50 girls out one-half day to five girls out one-half day, and labor turnover was reduced by 100 girls during the summer months.

### Cigar Rejects Reduced

Rejects in cigar production were reduced from between 3 and 4 per cent to between ½ and 1 per cent, and production went from 3,000 to 4,000 cigars per day, an increase of 25 per cent. Gross savings amounted to $29,546 per year with air conditioning—an outright profit of $23,371.50, since the owning and operating cost of the added air conditioning was only $6,174.50.

In its own offices, the Philadelphia Electric Co. made a three-year study of air conditioning and personal efficiency, which showed a reduction in time lost due to illness of 39.5 per cent in one office following installation of conditioning equipment, and of 56 per cent in a second, as compared with a similar office, not air conditioned.

## McArdle & Cooney, Inc. To Handle Parts

PHILADELPHIA—McArdle & Cooney, Inc., here, have added a full line of air-conditioning and refrigeration supplies to their wholesale line. For the past 30 years this company has handled plumbing, heating, and steam supplies.

Included in the new line are refrigerants, copper tubing, expansion valves, belts, and similar supplies.

## Highly Accurate Control of Conditions Features Installation in Laboratory For Common Cold Research

SAN FRANCISCO—Highly accurate regulation of air conditions necessary for the experimental work presented one of the most interesting problems in the installation of the air-conditioning system in the experimental laboratory of the University of California's College of Medicine here, where Drs. William J. Kerr and John B. Lagen conducted the research which indicated that colds can't be transmitted under controlled atmospheric conditions.

The results of this research were published in the May 22 issue of ELECTRIC REFRIGERATION NEWS under the heading "Medical Research Indicates Colds Aren't Transmissible Under Controlled Air Conditions."

### Conditions Required

G. H. Walker of the San Francisco branch, York Ice Machinery Corp., describes how the apparatus was set up and controlled to produce the required air conditions, as follows:

General dimensions are 14x26 feet, with some space in the center occupied by the ante room. The entire enclosure is insulated with 3 inches of corkboard. Windows have triple glass panes, and doors are of the regulation cold storage type, well gasketed to cut external air leakage down to a minimum.

"Since temperatures and humidities play such an important part in this work, to broaden the investigation it was necessary to establish duplicate air conditions over a range practically as wide as is found in the temperate zone in which we live," Mr. Walker states.

### Accurate Control Needed

"As in other test work, the accuracy of the control system is very important. Conditions have to be maintained without perceptible variations over extended periods of time," according to the York engineer.

Following is the range of conditions that were set up in the specifications to be maintained within the experimental space:

Relative humidity—30-85 per cent within ±1 per cent when dry bulb is anywhere between 43-50° F.; 10-85 per cent within ± 1 per cent when dry bulb is anywhere between 80-100° F.

*Temperature*—43-100° F. within ±1° F.

A central type of air-conditioning plant was installed, using a spray-type air washer complete with an automatically operated by-pass. The water for the washer is cooled externally by a York self-contained compressor unit operating on a tank equipped with a York flooded type cooling coil.

"The scheme of operation for this plant in conjunction with the automatic control provides a very interesting problem and in actual practice has worked out very satisfactorily," Mr. Walker states.

### 200 C.f.m. Outdoor Air

For ventilation purposes, about 200 c.f.m. of outside air is taken in through the air filter. This air mixes with the return air from the room, then goes on through the spray type air washer. Next it unites with that portion of the air which is bypassed around the air washer, and then passes on through the air heaters to the fan which circulates 1,500 c.f.m. of air at ½-in. resistance pressure.

The air is introduced to the room through several outlets arranged in a fan shape formation above the ante room. The return air is taken off at points close to the floor on the centers of the opposite three walls. With this general distribution, excellent uniform conditions are maintained, without perceptible draft.

The automatic control equipment is of the air operated type. The two major adjustment controllers, one for the dry bulb temperature and the other for the relative humidity, are located in the ante room on a hardwood panel board. The sensitive elements upon which these controllers are dependent are both located in the return air duct.

When cooling and dehumidification is necessary, the dry bulb temperature is controlled by the automatic operation of the air washer bypass, allowing more or less air to pass through the washer to suit the cooling demand in the conditioned space. When heating is required, the same dry bulb controller will operate upon the set of heaters located in the duct beyond the air washer assembly.

These heaters consist first of a tempering heater controlled by a separate thermostat which is set to increase the temperature of the air so that the leaving temperature is constant. Beyond this is a mixing damper which operates to bypass the air around another set of finned heaters. This mixing damper is operated by an air controlled damper motor, its position being regulated by the heat demand in the room.

### Regulates Spray Temperature

Function of the wet bulb controller is to regulate the temperature of the spray in the washer, in accordance with the moisture demand. When refrigeration is required, the spray water temperature is regulated by a diaphragm operated three-way valve, which adjusts the mixture of the return water from the dehumidifier with the cold water coming from the tank in a proportion necessary to maintain this required spray temperature.

The refrigerating machine operating on the water tank is controlled by means of a thermostat in the tank. This is set to maintain a water temperature sufficiently low to supply a proper spray temperature when the demand for refrigeration is at its maximum.

When conditions of operation are such that heating of the spray in the washer is required, a diaphragm valve in the steam line becomes operative, allowing the steam to pass into a set of coils located in the bottom of the air washer. At the same time, the three-way valve mentioned above sets itself into position so that all the solution recirculates directly from the pan to the spray.

A Brown recording potentiometer is also located on the control board panel. The dry bulb and wet bulb temperatures within the room, as well as the dry and wet bulb temperatures of the outside atmosphere, are continually recorded by this instrument.

**ELECTRIC REFRIGERATION NEWS**
Registered U. S. Patent Office
Copyright, 1935, by Business News Publishing Co.
Published Every Week by
BUSINESS NEWS PUBLISHING CO.
5229 Cass Ave., Detroit, Mich. Telephone Columbia 4242.

Subscription Rates—U. S. and Possessions and all countries in the Pan-American Postal Union: $3.00 per year; 2 years for $5.00. Canada: $6.00 per year (due to special tariff). All Other Countries: $5.00 per year (U. S. Money) (See "Buyers Guide" columns for combination rates with the 1935 REFRIGERATION DIRECTORY AND MARKET DATA BOOK.) Notice: We employ no subscription agents or solicitors. Pay no money to strangers claiming to represent this company. Send orders and remittances direct by mail.

F. M. COCKRELL, *Publisher*

GEORGE F. TAUBENECK, *Editor*
PHIL B. REDEKER, *Managing Editor*
FRANCES MCNAMARA, *Assistant Editor*
THEODORE T. QUINN, *Staff Writer*

GEORGE N. CONGDON, *Business Manager*
JOHN R. ADAMS, *Production Manager*
JEAN H. ADAMS, *Subscription Manager*
ROBERT P. NIXON, *Asst. Business Manager*
HELEN K. GILMORE, *Assistant Adv. Mgr.*

Member, Audit Bureau of Circulations
Member, Associated Business Papers
Member, Periodical Publishers Institute

VOL. 15, NO. 13, SERIAL NO. 331, JULY 24, 1935
*Circulation of this issue: 10,000 copies*

# Why Refrigerators Can Be Sold in August

TIMING is one of the most important elements of success in business, just as it is in politics, athletics, line production, and life in general. The Latins had two words for it: *Carpe Diem* (seize the day). Scads of more homespun maxims—"make hay while the sun shines," "a stitch in time saves nine," for example—tell the same fundamental truth. "There is a tide in the affairs of men," wrote Shakespeare, "which, when taken at the flood, leads on to fortune; if omitted, all the voyage of their life is bound in shallows and in miseries."

A man must be in position to open the door quickly when opportunity comes knocking, or all he has to show for the experience is a bunch of vain regrets. He must be ready to upset his schedule, to invert his ordinary routine of living, to revise previous procedure, to abandon comfort and habit, if he would profit by one of those fortuitous occasions when all factors seem to combine to make prosperous the man who *sees* and is ready to take advantage of the situation.

## Unprecedented Opportunity

ELECTRIC REFRIGERATION NEWS believes that such a moment has come for refrigeration dealers and salesmen. For years the industry has been talking about continuing the selling season through August. This year, for the first time, there seems to be an extraordinarily happy combination of circumstances which should make it possible for that dream to come true.

Here are some of the reasons why all previous sales records for the month of August should be broken this year:

*People Are Buying.* Reports from trade associations, from midsummer conventions, from financial services, and from department stores indicate that an unexpected buying wave began during the latter part of July, and that it has all the earmarks of lasting through the major part of August. "Get 'em while they're in the mood," in short, should be the salesman's motto just now.

*Hot Weather Is Here At Last.* After shying off throughout the spring and early summer—much to the disgust of the entire refrigeration industry—summer heat has at last descended on the country with full intensity. Almost immediate reaction to the thermometer jump has been noted by refrigeration sales organizations. Prospects who held off buying earlier in the year will now have their resistance lowered—just a couple of experiences with soured milk and melted butter, and it's practically all over but the signing. To add a second slogan to the one mentioned above: "Get 'em while they're hot."

*Time Payment Terms Are Lowest in History.* By taking advantage of the Federal Housing Administration's scheme of underwriting the risk on reverted merchandise (now made available to retailers through private financing agencies), the electric refrigerator dealer is able to offer the lowest instalment-selling terms in the history of the industry. Moreover, he is *absolved from the bugaboo of contingent liability.* Large numbers of purchasers don't buy price; they buy terms. Either way you look at it, the cost of the refrigerator to the customer is reduced materially. Salesmen will want to remind prospects that this government bonanza will not last forever (FHA funds are bound to run out some day, just as HOLC funds for mortgage refinancing have already), and that they should take advantage of the situation now while the "taking" is good.

*Mail-Order Boxes Out of the Market.* During the early part of the year many sales organizations were perturbed over the competition of the chain stores run by Sears-Roebuck and Montgomery Ward, which were offering 6 cu. ft. boxes at prices considerably below those of other concerns. Perhaps more "nuisance damage" (causing prospects to haggle over the price of other refrigerators) was done by these outfits than actual taking-away of sales. Nevertheless, dealers may be relieved to learn that both mail-order houses are said to be practically sold out of their 1935 supply of refrigerators, and will not be able to contract for more boxes until the 1936 season.

*Present Models Offer Replacement Opportunity.* When compared with the refrigerators sold even as recently as three or four years ago, this season's refrigerators are so definitely superior from the standpoints of performance, appearance, and *convenience* that many salesmen have found it possible to go back to old customers (particularly in the higher income brackets) and sell them a "1935 model." The convenience features of current models—as well as the economy of avoiding possible service bills—are providing the strongest selling arguments in getting replacement business.

## Specialty Selling Issues Coming

There are other good reasons why August should be an all-time record month for retail sales in the industry, reasons which will probably be supplied to field organizations by sales managers. But the above considerations are sufficient to persuade the editorial department of ELECTRIC REFRIGERATION NEWS that the four August issues of the paper should be devoted to specialty selling. As announced last week, these issues will contain a wealth of valuable suggestions and plans for *getting business now.* No dealer or salesmen should miss a single issue.

# WHAT OTHERS SAY

## Electric Kitchens as a Slum Clearance Feature

PLANS of the Housing Division of P.W.A. to include electricity for lighting, cooking, and refrigeration in the monthly rentals charged in its slum clearance housing projects are announced in this issue. It launches an experiment of great interest to the electrical industry. In a word, P.W.A. will offer small low-rent apartments, equipped with electric ranges and refrigerators, and by purchasing the energy at wholesale will be able to provide the tenant with the service at a saving over prevailing costs of coal and ice. The figures are impressive.

Immediate benefits to the electrical industry are obvious. Many non-profitable minimum bill customers of the local power company will now produce an income of from $2.30 to $2.90 per month and at the same time the usual costly customer transactions will be eliminated. Manufacturers will sell the appliances in bulk with opportunity to plan ahead for unusual production economies. Contractors will enjoy a greatly increased wiring job. But the most appealing prospect is the stimulus that should come out of such an experience to the whole idea of complete electrical equipment in the home. For if the electric kitchen can be made available in these large-scale, low-cost housing projects higher class tenants will demand the same conveniences. And the history of the bathroom proves that once let electric cooking become standard in the new apartment and it will soon be in universal demand.

This may bring problems to owners of modernized homes. But the government offers liberal subsidies. The purchase of power at wholesale will apparently cover energy costs, repairs, and fixed charge allowances, even in nominal rentals. And the added comforts offered assure a market for the dwellings.

The most serious problems confront the power companies. What will be the effect of replacing large numbers of retail customers with a few wholesale accounts? What will be the reaction of other consumers who cannot be served under such a plan? The situation will need careful study. But it will be a notable adventure both in converting minimum bill customers to a profitable status and in promoting electric cooking and refrigeration.—*Electrical World,* July 20, 1935.

# LETTERS

## No. 1—O. K.; No. 2—?

Armstrong Cork Products Co.
Successor to
Armstrong Cork & Insulation Co.
Lancaster, Pa.

Editor:

Congratulations on your very broad-minded editorial entitled "Ice Industry Shows Signs of Awakening" which appeared in the June 19 issue of your publication. Having been closely allied to both the ice refrigerator and the electric refrigerator industries for many years, I have always been keenly interested in the methods of merchandising and the sales programs of each. I feel that your editorial covered the subject sincerely.

Your Suggestion No. 1, of not fighting the new ice refrigerator but adopting it, is certainly a common sense one. I am sure you will find that in the great majority of cases the ice industry has learned that it is futile to fight the electric refrigerator and that the most effective means is to promote the merits of ice refrigeration.

Certainly the extensive promotion work carried on by the large electric refrigerator manufacturers has taught the public the real necessity of adequate refrigeration whether it finally be by mechanical means or by ice.

I do question the practicability of your Suggestion No. 2 in the design of a convertible refrigerator. The modern ice refrigerator is being marketed mostly through the ice man and the new convertible cabinet would hardly fit in with this method of merchandising. However, this suggestion could be adopted where large numbers of refrigerators are sold for large building projects such as some of the recent municipal housing projects.

E. J. STERN,
Manager, Temlok Equipment Sales.

## It's All in the Book

American Shipping Co., Inc.
8 Bridge St., New York City

Editor:

We thank you for the sample copy of your publication which you sent us, dated June 26.

We were interested in receiving this, on behalf of one of our foreign friends, and they are also interested in securing the list of manufacturers of mechanical refrigerators.

I presume the REFRIGERATION DIRECTORY AND MARKET DATA BOOK covers this in detail, with manufacturers of parts, etc., but our friends are only interested in the addresses of manufacturers of mechanical refrigerators, and can you tell us where such list is available, and at what cost, if any?

A. E. GRASER,
President.

*Answer:* We believe that it will be much more satisfactory to your client if you will secure a copy of the 1935 REFRIGERATION AND AIR CONDITIONING DIRECTORY which contains detailed information regarding the large number of manufacturers making various classes of refrigeration equipment.

This book is published just for the purpose of answering such questions and it is impossible for us to prepare individual lists in answer to the thousands of requests for such information.

Please note that we can furnish a book of 380 pages containing *all* sources of supply at a nominal price of $3 per copy only because of the revenue obtained from advertisements contained in this book. No benefits accrue to these advertisers if the desired information is furnished in the form of letters.

Also, we have found from experience that much delay and dissatisfaction is encountered by foreign buyers because of inadequate information. The cost of the DIRECTORY will easily be saved by the elimination of unnecessary correspondence.

## Coils by Trane

The Trane Co.
La Crosse, Wis.

Editor:

I am very much interested in your July 10 issue of ELECTRIC REFRIGERATION NEWS regarding the Kemp hotel.

It so happens that The Trane Co., designed and built the room cooling units and Baker furnished the compressor equipment. No place in your article was this statement mentioned.

N. DOWNEY,
Advertising Manager.

"Please accept my comment on your paper. I surely enjoy it a lot, enclosed please find check for $3."—Fritz Harder, Electric Refrig. Service. 123 Delmar Pl., Syracuse, N. Y.

"I am very interested in your articles on servicing of refrigerators and would sure hate to miss out on any of them."—Harold Berg, 653 East Second St., Winona, Minn.

## Meaty & Humorous Ideas

The Filtrine Mfg. Co.
53 Lexington Ave., Brooklyn

Editor:

I have been meaning for sometime to express my appreciation of Sam Vining's meaty and humorous "Sales Idea" column in the ELECTRIC REFRIGERATION NEWS.

I have always appreciated his ability and humor and I am glad that he has found this medium of expression.

C. F. HANSEL,
President.

## Export Agent Omitted

C. A. Richards, Inc.
304 East 45th St., New York City

Editor:

On page 355 of Volume I of the 1935 DIRECTORY, you list some export agents. We note that our name is not included, which is probably our fault in not advising you.

We are the exclusive export agents for the General Household Utilities Co., Chicago, makers of Grunow refrigerators, and would appreciate your putting our name in the next edition.

C. A. RICHARDS,
President.

# BOOKS

## The Rise of Modern Physics

**Author: Henry Crew, Northwestern University. Publisher: The Williams & Wilkins Co. Pages: 417. Price: $4.00.**

STUDENTS and service men in the field of air conditioning and refrigeration engineering will find the revised and enlarged edition of "The Rise of Modern Physics" a welcome addition to their background of general scientific knowledge. It should also be of specific help in aiding their understanding of air-conditioning theory.

The book traces the origin and development of modern physics from the time of pre-Greek physics through Greek, Roman, Arabian, and Medieval to modern physics. It is well-illustrated with portraits of the physicists mentioned.

The first five chapters deal with the development of the science of physics up to the time of Galileo, which marks the birth of modern physics. Physicists who contributed to the development of the science up to that time include Pythagoras, Euclid, Ptolemy, Leonardo da Vinci, Copernicus, etc.

The development of kinetics was the achievement of three different minds—Galileo, Huygens, and Newton, representing three different nations. The author gives a brief biographical sketch of the lives of each of these men and outlines the contributions of each to the development of the science.

Chapter VI deals with the foundation of modern optics. Of particular interest to the electrical student is the chapter on pioneers in electricity and magnetism. In this chapter, the author discusses the magnetism of the earth, magnetism as a molecular phenomenon, the law of inverse squares, and the early history of electricity.

Chapter VIII deals with the nature of heat and includes a discussion of the mercury-thermometer, the air-thermometer, heat as a measurable quantity, and the first and second laws of thermodynamics.

Boyle's Law, the kinetic theory of gases, and the atomic theory of matter are briefly explained in Chapter IX. Chapters X and XI deal with electrolysis and electromagnetism, up to the era of the vacuum tube, discovered by Thomas A. Edison.

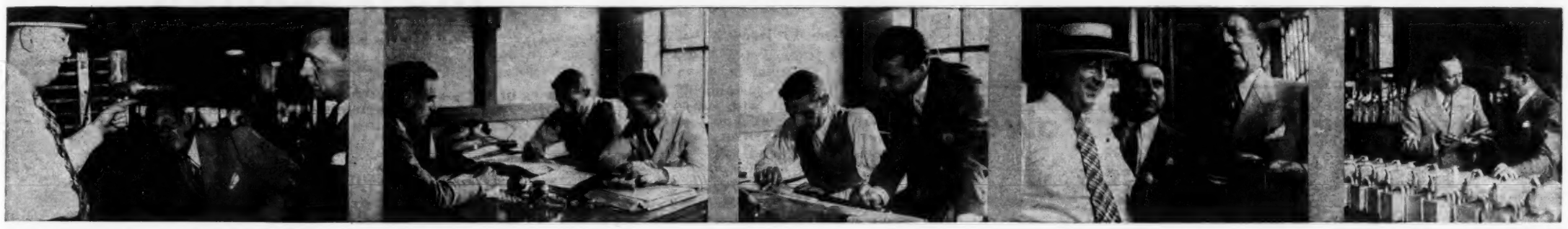
The following chapter describes the origin of modern electrical units and recounts the development of the metric system, the magnetic and electric systems, the practical system, the "International" system of units, and the "definitive" system of Giorgi, Robertson, and Campbell.

Chapter XIII is devoted to a discussion of the inertia of electricity including the specific electronic charge, gyromagnetic effects, gyromagnetic ratio, and gyromagnetic anomaly. The rise of modern spectroscopy, is treated in some detail by the author in the next chapter.

The author concludes this interesting study of the rise of modern physics with a chapter on restricted relativity. He relates the Michelson and Morley *impasse,* experimental facts of relative motion, the assumptions of restricted relativity, and the Lorentz Transformations.

An interpretation and application of the equations of relativity are written under the following divisions: simultaneity, Lorentz contraction of distance, Einstein dilation of time, addition of velocities, inertia of energy, variability of mass, and measure of kinetic energy.

# Fedders Factory a Busy Place as Branch Managers Look over Company's New Products



In the Buffalo plant of Fedders Mfg. Co. during the recent convention of Fedders branch managers. (1) Frank Slagel (center), Pacific coast regional manager, gets the "why" of manifolding Fedders air-conditioning coils from Sales Manager W. D. Keefe, as Assistant Sales Manager E. G. Wagner looks on. (2) Frank Haag, New York branch manager, H. E. Rieckleman, assistant to the president, and Leo Freitas study the latest Fedders catalog. (3) "Here it is . . ." Mr. Rieckleman and Charles Rittling settle a point by referring to Electric Refrigeration News. (4) Mr. Keefe, Mr. Wagner, and Mr. Slagel, with one of the new high capacity expansion valves. (5) Mr. Slagel takes Mr. Wagner right down to the assembly line to put over an idea.

## AIR CONDITIONING

### Year-'Round Air Conditioning to Feature 48 New Homes in Washington

WASHINGTON, D. C.—Complete year-around air conditioning will be the principal selling feature of 48 moderately priced homes, now under construction here under the direction of Frank Koplin, head of Washington Builders, Inc.

The homes, built to sell for $11,950, are being provided with electric range, refrigerator, and General Electric air conditioning as standard equipment. They will occupy a tract near Fourteenth St. and Rittenhouse, Northwest, in one of the Capital's attractive residential districts.

Of the semi-detached type so currently popular in Washington, the houses will have full basements, each containing laundry, garage, and a large room which can be converted into a recreation room.

**Insulated Brick Walls**

The first floor will contain a large dropped living room, dining room, entry hall, kitchen, and dinette, and the second floor will have three bedrooms and two baths.

Walls will be of brick, and the houses will be well insulated for the most effective heating and cooling. They were designed by Harry Sternfeld, professor of architecture at the University of Pennsylvania. First group of houses, it is expected, will be ready for occupancy by midsummer.

The order for the air-conditioning equipment was placed through Hudson Air Conditioning Corp., G-E Washington air-conditioning dealer.

Equipment for each home will include a gas furnace, a 1½-hp. refrigerating compressor for cooling, and a special air-conditioning unit assembly containing a blower, heating and cooling coils, evaporator, humidifier, and filters.

**Unit Suspended in Basement**

The unit, which will be 43 in. square and 18 in. high, will be suspended from the basement ceiling. Concealed ducts will distribute conditioned air through the house. The system is designed to supply conditioned air to one floor at a time during the cooling season. By means of dampers, the first floor may be cooled by day, and the bedrooms on the second floor by night. When temperatures are not too extreme, the entire house may be cooled at once.

Controls are automatic. On the first floor will be a G-E single blade room thermostat, humidistat, year-around control switch for heating, cooling, and circulation, and a thermostat transfer switch. In the master bedroom upstairs will be another thermostat, to control operation of the condensing unit during the night, when the bedrooms are being cooled. The thermostat transfer switch will allow the owner to cut out one thermostat and cut in the other when the cooling is transferred from one floor to the other.

The system is designed to circulate 1,000 c.f.m. of air in the heating season, and 800 c.f.m. in the cooling season, of which approximately one-third will be outdoor air. It will provide six complete changes of air per hour while heating, and eight or nine while cooling.

**20,000 B.t.u. Cooling Capacity**

Cooling capacity will be 20,000 B.t.u.'s per hour, providing an indoor temperature of from 10 to 15° cooler than that outside. The heating capacity will be 90,000 B.t.u.'s per hour, and the humidifying capacity 3 lbs. per hour.

The principle of cooling adopted for this development—the cooling of one floor at a time—is said to be the most feasible application of summer conditioning for the small home, lowering first cost to the builder as well as operating costs to the buyer.

Washington is currently enjoying a building boom, the result of a 20 per cent increase in population in the past two years. A number of other leading Capital builders are said to be considering the installation of year-around conditioning systems in homes which they are constructing.

### Abraham & Straus Dept. Store Buys Air Cooling

BROOKLYN—What is said to be metropolitan New York's largest department store air-conditioning system is being installed for the Abraham & Straus store here by York Ice Machinery Co.

The installation will employ a cooling system rated at 1,050 tons of refrigeration, and will circulate 405,000 cu. ft. of conditioned air per minute. A total of 355,000 sq. ft. of floor area is being conditioned, or 39 departments, comprising 90 per cent of the store's entire selling space.

York is installing 71 large horizontal unit type air conditioners, each to be supplied with cold water from the refrigerating system in the basement. Basement equipment consists of three 15x13½-in. four-cylinder Freon compressors, two 60 in. x 16 ft. condensers, one 43 in. x 16 ft. water cooler, and two 53 in. x 16 ft. water coolers.

A large cooling tower is being installed on the roof of the building.

### 2 Servel Units Set Up 'Circular Air Motion' To Cool Restaurant

SPRINGFIELD, Ill.—George Morton restaurant here, recently equipped with a Servel air-conditioning system, is becoming increasingly popular with restaurant patrons during these hot summer days.

The equipment was installed by the Capital City Paper Co., Servel commercial and air-conditioning equipment distributor in this territory. It consists of two heavy-duty Servel air-conditioning units, suspended at opposite ends of the dining room, blowing lengthwise to set up a circular motion within the conditioned space.

Each of the units has a capacity of 3¾ tons of refrigerating effect per day, and both are connected to a 7½-ton Servel machine unit.

Special consideration was necessary in figuring the installation, due to the unusually large glass exposure load, in addition to a considerable cooking and electrical appliance load.

The units circulate over 300,000 cu. ft. of air per hour, conditioning the entire air content of the space every four minutes. One of the units, mounted over the front entrance, draws 60,000 cu. ft. of air per hour from outside the building, to insure freshness and freedom from smoke and food odors.

The fresh air, introduced at the front of the dining room, has a tendency to set up a general air movement toward the kitchen, eliminating infiltration from the kitchen into the conditioned space.

### Friez Develops New Type Psychrometer and Hythergraph

BALTIMORE—Just put on the market by Julien P. Friez & Sons, Inc., are two new instruments for humidity readings—the Friez Motor-Operated Thermo-Shield Psychrometer and the Friez Hythergraph. The former is designed primarily for laboratory work, and the latter for use with commercial air-conditioning installations.

The psychrometer is designed to eliminate error due to heat radiation from surrounding objects, including the operator, when humidity readings are being taken. The air sample is drawn through the top, away from proximity with the operator, and the initial warmth effect of wet-bulb reservoirs is eliminated by applications of water to the wet bulb for each reading.

The mechanism is encased in a chromium-plated thermo-shield, equipped with a glass window for thermometer visibility and an integral rack for psychrometric tables. Thermometers are graduated from –5° to +130° in ½° increments.

The hythergraph follows the general lines of the Friez hygro-thermograph, but details have been modified and a commercial finish given, lowering the instrument's price.

Simultaneous records of relative humidity by means of multiple human hair element and of dry-bulb temperature by means of a rectangular chart, are given on common time lines.

This new instrument is offered for either daily or weekly records, an eight-day clock being provided in either case. The rectangular chart record is given progressively, for easier reading.

The instrument is designed primarily for permanent installations in department stores, theaters, restaurants, hotels, or industrial work. It is available in semi-portable form, with carrying handle, at no extra cost.

A year's supply of charts for the hythergraph is also included with the instrument.

A number of these new instruments have been supplied through York Ice Machinery Corp. for the Bloomingdale and Abraham & Straus department stores in New York City, and for the Kahn department store, Washington, D. C.

### Mrs. Ora Snyder Claims Comfort Cooling Boosts Candy Store Profits in Two Ways

CHICAGO—Eight of the 14 candy shops owned and operated by Mrs. Ora Snyder, famous home-made candy manufacturer here, are equipped with air conditioning.

"And I'll not be satisfied until I have them all fitted up in the same way," she declared recently. "I have found it advantageous in drawing customers and holding them, and that holds for any retail store. But where foodstuffs or other perishable products are involved air conditioning will, as in my case, pay for itself. Profits will be two-fold: from prevention of deterioration of stock and from increase in patronage. Store personnel also enjoys comfort and health without additional cost."

**First Installation in 1934**

Mrs. Snyder has been in business in Chicago for 26 years. Two years ago she made her first air-conditioning installation.

"I had opened a big candy shop near the South Shore Country Club. The neighborhood had been studied with great care before we signed the lease and it looked ideal for big business. But—the shop had a south and west exposure and all afternoon the windows got the full effect of the sun.

**Tons of Candy Damaged**

"Sometimes it was so hot inside that the clerks couldn't stand it and as for the candy—I had 175 different kinds in my stock, and the chocolates turned to soup while the hard candy just simply settled down into solid lumps.

"During June of that summer I had to throw out almost a ton of chocolates. We had the same trouble in our Hamilton Club shop downtown, and I had to dump out more candy there.

**Conditioning Solved Problem**

"Someone suggested air conditioning to cure the trouble. I didn't know much about it, but like the drowning man when he sinks, I was willing to grab at any straw. So I invested $2,000 for a large system in one of my shops. A month later I put in another installation at the Hamilton Club and in both places those tremendous losses with all their vexation and the distress they caused to my peace of mind as well as my pocket book, were stopped."

**Fair Booth Air Cooled**

During the 1934 Century of Progress exposition, Mrs. Snyder leased a small 10x50-ft. cubby hole on the west approach to the Swift Bridge of Service, and installed air-conditioning apparatus. She later moved the equipment to one of her shops up town.

"We made our own ice cream in that tiny plant and the air-conditioning outfit sure played an important part in that project. On our biggest day we froze 355 gallons of cream, working all night, in an effort to get a good supply ahead of the demand. If we hadn't had air conditioning I don't know how we could ever have kept any cream in storage any time at all."

Mrs. Snyder's Union League shop on Jackson Blvd. is equipped with a Carrier air-conditioning system.

### Utility Sells 15 Air-Cooling Systems During June

NEWARK—Customers of the Public Service Electric & Gas Co. of New Jersey installed 15 air-conditioning systems employing electric refrigeration for cooling purposes during the month of June, setting a new all-time monthly high for air-conditioning installations made on the company's power lines.

The 15 installations in June compares with a total of 21 installations made during the *entire year* of 1934, according to the utility company's air-conditioning department.

# SERVICE

## Thermostatic Expansion Valve Design and Function

*Editor's Note*: Mr. Newcum's articles constitute a manual of information on present-day refrigeration systems which will add to the service man's knowledge of refrigeration, and which will assist him in meeting specific problems in servicing operations in the field.

Discussed in this week's article is the operation of various types of thermostatic expansion valves, and possible service problems that may be encountered with this type of refrigerant control.

Following is an outline of Mr. Newcum's articles as they have appeared in the NEWS.

**April 10 Issue**

Chapter 1—THEORY OF REFRIGERATION

This chapter deals with fundamentals of refrigeration. Inasmuch as refrigeration is really a process of the removal of heat from a given space, "these" fundamentals consists mainly of the terms, definitions, and physical laws which are involved when heat is transferred from one substance or space to another location.

**April 17 Issue**

Chapter 2—PRINCIPLES OF MECHANICAL REFRIGERATION

Three principal parts of the household refrigeration system—cabinet, condensing unit, and evaporator—are described briefly in this chapter, and the operating cycle of a refrigerator is explained in detail. Also published with this chapter is the refrigerant pressure-temperature chart and an explanation of service gauges.

**April 24 Issue**

Chapter 3—COMMON REFRIGERANTS

Properties which are necessary for a good refrigerant are outlined in this chapter, which also gives a detailed comparison of the physical properties and characteristics of the following refrigerants: sulphur dioxide, methyl chloride, ethyl chloride, ammonia, and Freon.

**May 1 Issue**

Chapter 4—CONDENSING UNITS
(Instalment 1: description of various compressor parts.)

Design and functions of the following compressor parts are described: compressor body assembly, housing assembly, crankshaft and connecting rod assembly, eccentric shaft and connecting rod assembly, piston and piston valve assembly, and discharge valve assemblies. Service operations on these various compressor parts are outlined.

**May 8 Issue**

Chapter 4—CONDENSING UNITS
(Instalment 2: stuffing box seals, flywheel, and direct-connected condensing units.)

Different designs of stuffing box seals, operating principles of these seals, and methods of servicing them are explained and illustrated. Flywheels and direct-connected condensing units are also discussed.

**May 29 Issue**

Chapter 4—CONDENSING UNITS
(Instalment 3: rotary compressors.)

Rotary compressor design, operation, and servicing are described, with Norge and Majestic makes discussed in some detail.

**June 5 Issue**

Chapter 4—CONDENSING UNITS
(Instalment 4: care and servicing of shut-off valves and gaskets.)

Operation and servicing of the various shut-off valves are outlined in this article, and suggestions given on the care of gaskets.

**June 12 Issue**

Chapter 4—CONDENSING UNITS
(Instalment 5: condensers.)

Various types of condenser design are described and illustrated, and suggestions made for their care and servicing.

**June 19 Issue**

Chapter 4—CONDENSING UNITS
(Instalment 6: liquid receivers.)

Described in this instalment are liquid receivers used with air-cooled condensers. Horizontal and vertical receivers for flooded and dry systems are explained.

**June 26 Issue**

Chapter 5—EVAPORATORS
(Instalment 1: flooded evaporators with low side float valve.)

This article explains the operation of the flooded system with the low side float valve and gives information on service problems that are likely to be met.

**July 3 Issue**

Chapter 5—EVAPORATORS
(Instalment 2: high side float valves and flooded evaporators.)

Different types of high side float valves and their use in flooded systems are discussed and illustrated in this issue. The article also explains service problems which may be encountered and deals with the liquid temperature valve.

**July 10 Issue**

Chapter 5—EVAPORATORS
(Instalment 3: automatic expansion valves.)

Design and operation of automatic expansion valves, covering particularly the Frigidaire and Kelvinator types.

**July 17 Issue**

Chapter 5—EVAPORATORS
(Instalment 3: automatic expansion valves, continued.)

A continuation of the discussion of the operation and adjustment of automatic expansion valves.

### Thermostatic Expansion Valve

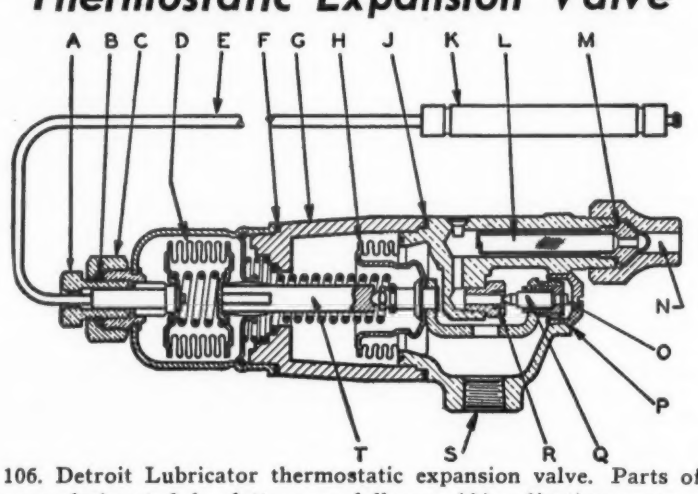



Fig. 106. Detroit Lubricator thermostatic expansion valve. Parts of the valve are designated by letters as follows: (A) adjusting screw; (B) packing around adjusting screw; (C) packing nut; (D) thermostatic power element; (E) flexible capillary tube; (F) moisture-tight joint; (G) bakelite extension; (H) bellows seal; (J) moisture-tight joint; (K) thermostatic bulb; (L) strainer screen; (M) copper gasket; (N) inlet connection for ¼-inch copper tube; (O) needle swivel; (P) solder-sealed plug; (Q) stainless steel needle; (R) stainless steel seat; (S) outlet connection; (T) bakelite push-rod.

### 67. Thermostatic Expansion Valves

The thermostatic expansion valve differs largely from the automatic valve in that the action of the valve is governed by temperature, whereas the automatic valve is actuated by pressure. This feature completely changes the operating characteristics and application.

A thermostatic expansion valve may be defined as being an automatic expansion valve with the adjusting nut and spring removed, and a thermostatic power element installed in its place.

The thermostatic power element is charged with a so called thermostatic liquid, usually being refrigerant. This refrigerant is generally the same as the refrigerant in the system of which the valve is to be a part.

This thermostatic power element is connected by means of a small flexible capillary tube to a thermostatic bulb. The refrigerant being partially in a liquid state is effected by changes in temperature.

When the temperature is increased, the pressure within the power element and bulb is likewise increased, and vice-versa. The thermostatic valve is then actuated by the changes in temperature of the thermostatic liquid (refrigerant) in the thermostatic bulb, and its corresponding change in pressure, which in turn responds on the power element, causing the valve to open with an increase in temperature (pressure) and close on a decrease in temperature (pressure).

Fig. 106 shows a cross section of the Detroit thermostatic expansion valve. Note the expansion valve proper is identical to the automatic valve shown in Fig. 103 under automatic expansion valves.

The needle is connected by means of a yoke to the bellows, which by movement provided causes the needle to move to and from the seat, as the valve opens and closes.

This movement is provided by the power element D, and capillary tube E, and the thermostatic bulb K, which contains the thermostatic liquid. The movement from the power element is impelled to the bellows H by means of the bakelite push rod T. Surrounding the push rod is a spring which opposes the spring inside of the power element.

When the valve is properly installed in the system, the inlet N is connected to the liquid line from the liquid receiver. The outlet connection S is connected to the evaporator inlet. The bulb K is securely clamped to the suction line adjacent to the outlet of the evaporator, and a definite contact is provided by using the metal clamp (Fig. 107).

Fig. 108 shows the valve installed on a domestic evaporator with the bulb clamped to the suction line.

Before the system has been put into operation the thermostatic bulb is warm, and the pressure in the bulb and power element is high. This high pressure elongates or expands the power element D, which forces the push rod T down against the bellows H, forcing it inwardly, which in turn moves the yoke inwardly holding the needle off the seat.

With the needle off the seat, the valve is wide open. The liquid line valve is then opened, allowing liquid refrigerant to enter through the inlet connection N through the screen, through the valve body, to and through the orifice in the seat R, and

*(Concluded on Page 11, Column 3)*

### How Bulb Is Clamped

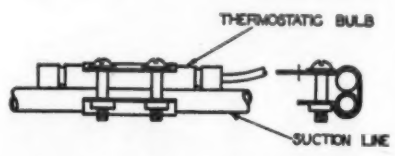



Fig. 107. How bulb on Detroit thermostatic expansion valve is clamped to the suction line.

### Valve on Evaporator

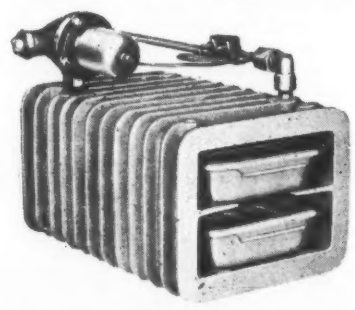


Fig. 108. Installation of a thermostatic expansion valve on the evaporator of a household electric refrigerator, showing bulb clamped on the suction line.

# INSTALLATION OPERATIONS

**A SERIES OF LESSONS OUTLINED FOR THE USE OF THE SERVICE MANAGER IN INSTRUCTING BEGINNERS IN INSTALLATION WORK**

## No. 15—Remote Installation of Condensing Units

By K. M. Newcum

TOOLS NEEDED:

Level, rule, oil can and oil, screw driver, hammer, adjustable wrenches.

PROCEDURE:

1. Select proper location for compressor. Refer to Precautions below.
2. Put compressor on base or legs provided and tighten in place.
3. Set compressor in exact location and level by either adjusting the legs or spacing under the legs with wooden wedges.
4. Remove caps from oil reservoirs on motor and fill with a light grade of automobile oil. Replace caps and wipe excessive oil from motor with cloth.
5. Check all bolts and nuts as they may have become loose in moving or shipping.
6. Check the tension on the belt. Tighten if necessary, but do not get it too tight.
7. Check with the instructor.

PRECAUTIONS:

1. The room must have sufficient air space to provide circulation for the compressor. 300 cubic feet is required for the smaller models.
2. The compressor must not be installed in a room which has an average temperature higher than 100° F. or a lower temperature than 25° F.
3. The compressor must be installed in a dry place. If there is danger of the basement flooding with water, as a result of inadequate draining facilities, a base or platform should be built of sufficient height to place the compressor well above the danger line. The base must be rigid or vibration will result.
4. The compressor must not be placed near heating systems, as the heat will effect a considerable loss of efficiency in the compressor, and poor results may be expected.
5. The compressor must be placed where it is accessible for oiling the motor and servicing.
6. The compressor must be placed so that the condenser, or the flywheel, as the case may be, is at least 6 inches from the wall. This allows sufficient space for air circulation if the condenser is to be placed toward the wall and sufficient space for removing the flywheel if the flywheel is to be placed near the wall.
7. The compressor must be placed in such a position that the valves and other mechanism will be accessible for servicing and adjusting.
8. The compressor must be level, rigid, and in proper alignment. In leveling the compressor, be sure that it is shimmed or adjusted so that there is no strain on the frame.
9. The moving parts such as the flywheel and motor pulley should be covered with a guard to prevent children and pets from the danger of becoming injured.
10. All electrical connections must be covered.
11. The motor or frame must be grounded to a cold water pipe, so that any short circuit will not be transmitted to the user in the form of an electrical shock.
12. The compressor should never be suspended from the rafters of the basement ceiling as all vibration noises will be transmitted through the building.

## Frigidaire Valve

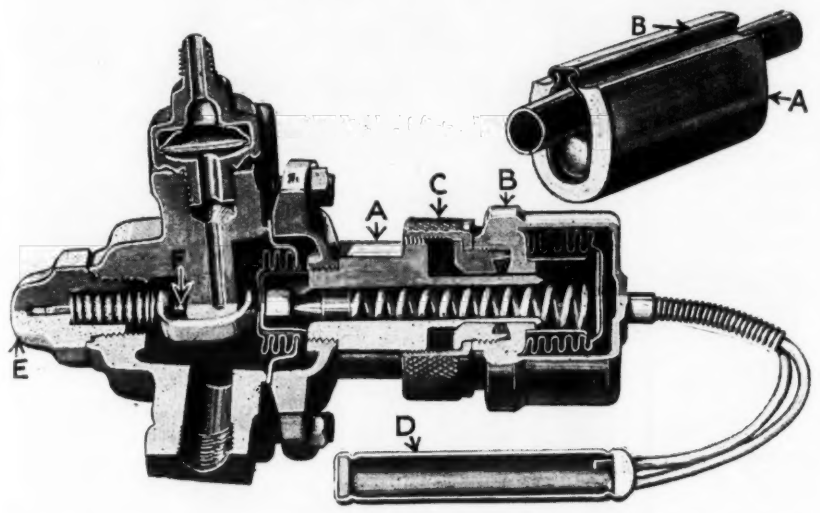



Fig. 109. Frigidaire thermostatic expansion valve. In the main part of the illustration "A" designates an insulator which is placed on the valve to break the contact between the metal housing of the thermostatic bellows and the metal valve body. "B" is the thermostatic element which may be entirely removed from the valve without damaging the mechanism.

## Fedders Valve

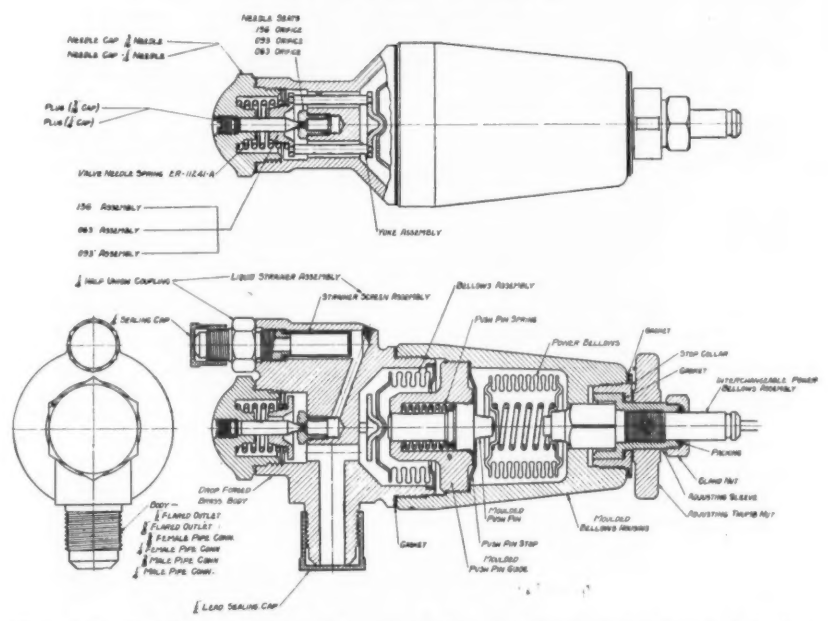



Fig. 110. Fedders thermostatic expansion valve, showing in detail the various parts in this particular design of a thermostatic expansion valve.

## Correcting an Error in Illustrations For Article in Previous Issue

The drawings designated as Figures 103 and 104 in Mr. Newcum's article in the July 17 issue of Electric Refrigeration News became transposed when the issue was being made up and consequently were published over the wrong descriptive material. They should have appeared as below.

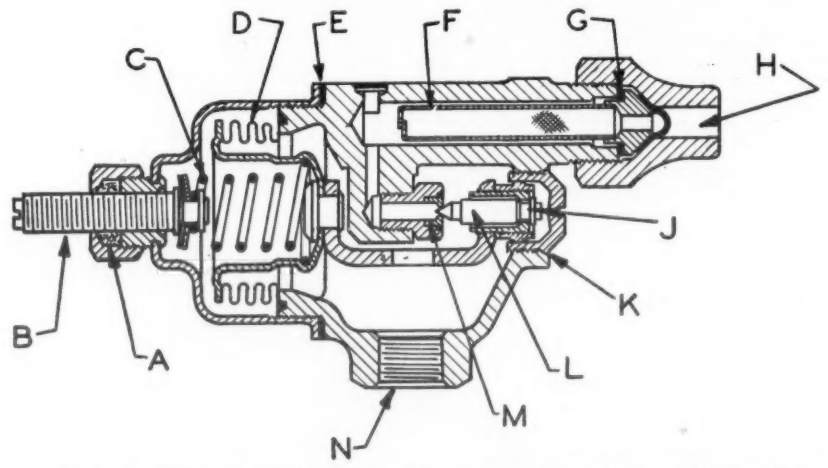



Fig. 103. Detroit Lubricator automatic expansion valve employing the flexible metal bellows. (A) moisture-tight packing around adjusting screw; (B) adjusting screw; (C) adjusting spring; (D) bellows; (E) joint; (F) strainer; (G) copper gasket; (H) inlet connection ¼-inch copper tube; (J) needle swivel; (K) plug hermetically sealed with solder; (L) needle; (M) seat; (N) outlet connection.

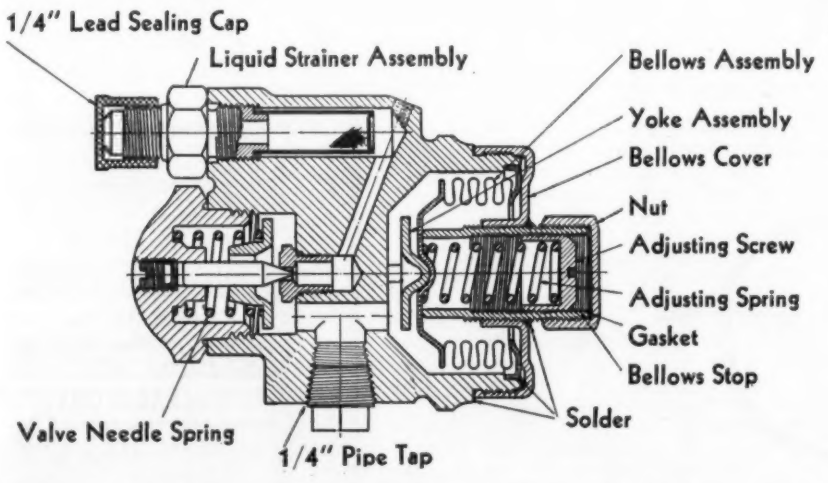



Fig. 104. Fedders automatic expansion valve, with various parts enumerated by means of arrow-head lines.

## Thermostatic Expansion Valve Operation

*(Concluded from Page 10, Column 5)*

thence into the valve body proper, and on into the evaporator.

Upon entering the evaporator the refrigerant expands, and increases the pressure in the low side of the system and responds on the bellows H. As the compressor is in operation, drawing the expanding gasses from the evaporator, the pressure is not sufficient to overcome the pressure in the power element and the valve remains open.

As the system continues to operate, the evaporator becomes chilled and finally the saturated vapor reaches the end of the evaporator and starts to frost the suction line. At this point the bulb K is clamped.

As the suction line starts to frost, the bulb becomes chilled and the pressure of the expanded refrigerant within the bulb reduces, contracting the power element bellows D and partially closing the valve.

With the valve partially closed the tail end of the evaporator soon becomes warm again and the pressure within the power assembly increases again allowing the valve to open wider, supplying more refrigerant to the evaporator. This supply soon reaches the bulb K again and the valve is partially closed.

Operation of the valve in this manner is continuous through the entire operating cycle of the compressor. Gradually as the entire evaporator becomes chilled and the refrigerator temperature is reduced, the bulb K will tend to remain cold, keeping the valve restricted, and the pressure in the low side continues to decline with the reduction of the temperature of the evaporator, the refrigerator, and namely, the bulb.

The system continues to operate in this manner with the valve fluctuating only slightly with the low temperature, until the temperature of the refrigerator, the evaporator, and the bulb has been reduced to the desired point. At this point there will be a very definite operating back pressure, and the low pressure control (pressurestat) may be set to cut out and stop the system.

On the off cycle, the temperature of the refrigerator increases through heat leakage etc., and this increase in temperature is responded on the bulb K. During the entire off cycle while the refrigerator is warming up, the bulb is also warming up and the valve is gradually opening, allowing the pressure to increase in the lowside of the system.

When the refrigerator has reached the desired temperature, the back pressure will have risen to a definite point, at which point the low pressure control may be set to cut in and put the system back into normal operation, again gradually reducing the pressure in the lowside as the temperature decreases to the point at which the low pressure switch is set to cut out.

Due to the operating characteristics of the thermostatic valve, it may be successfully used on a single unit with either the low pressure control, or the thermostatic control. It may be used in multiple, that is, two or more evaporators may be operated from one condensing unit successfully by using thermostatic expansion valves.

Where the units are in multiple the low pressure control is generally used to control the starting and stopping of the motor. The thermostatic control may be used to control the system but it will control only the temerature of the one unit to which it is connected.

Units of different temperatures may be used in multiple with thermostatic expansion valves, where the installation is properly engineered, and evaporators of the correct size and capacity are employed for their respective demands.

Inasmuch as the operation of a system using thermostatic expansion valves is similar to the low side float flooded system it is not considered impractical to use the two types of systems on the same condensing units. This is a matter of balancing the evaporators, and adjusting the valves.

A Frigidaire thermostatic expansion is illustrated in Fig 109. The arrangement of the mechanism is some different but the general operation is the same as the Detroit valve.

The Fedders thermostatic valve is shown in Fig. 110. It too has different mechanical features, but the general operation is the same as the two valves previously illustrated.

Thermostatic expansion valves are adjusted at the factory to maintain a full frosted coil without allowing a frost back. It is considered good policy to allow the system to operate for several hours before making any adjustments. A thermostatic valve should be adjusted just like the automatic valve.

That is, when the desired refrigerator temperature is reached, the entire evaporator should be frosted to the bulb, this assures the use of the entire evaporator surface, and the highest possible condensing unit efficiency. Each of the three valves illustrated are adjustable, and the operating back pressure may be increased by turning the adjusting device clockwise or to the right.

Conditions affecting the life of the thermostatic valve are the same as in the automatic. A good filter should always be installed in the liquid line to prevent foreign particles from lodging under the needle at the seat.

The valve may be flushed by closing the liquid line valve, and operating the system down to a vacuum, and then allowing the evaporator to warm up. This allows the bulb to warm up and opens the valve wide. The sudden rush of liquid when the valve is again opened should remove any particles of dirt.

One of the most common causes of unsuccessful thermostatic expansion valve operation is the improper location of the bulb. The bulb must be located in such a manner that it will always be in a colder atmosphere than the power element.

Should the power element be in a colder place, the refrigerant will leave the warmer bulb and collect in the colder power element. If the refrigerant is in the power element, the thermostatic action of the valve is nil, and the improper operation will result.

Very often to obtain the correct location for the valve, it is necessary to run a tube from the expansion valve outlet to the coil inlet, so that the expansion valve may be elevated to a high and warmer location than the bulb. The bulb should be in the cold air current if at all possible, and should never be so located that it will be effected by the warm air currents in the refrigerator.

# SERVICE OPERATIONS

**A SERIES OF LESSONS OUTLINED FOR THE USE OF THE SERVICE MANAGER IN INSTRUCTING BEGINNERS IN SERVICE WORK**

## No. 15—Adding Oil to the Compressor (All Makes)

By K. M. Newcum

REASON:

Oil serves as a lubricant in the refrigerating system as it does in an automobile engine, and a sufficient amount must always be present. However, under ordinary operating conditions, the oil in a small refrigerating system does not break down (ammonia jobs excepted) or deteriorate. Thus the addition of oil is only necessary where there was not enough oil originally charged into the unit by the manufacturer, or where a part of the oil has been removed while servicing the unit or where the oil or a part of the oil leaked out with the refrigerant, or where coils have been changed and the last coil installed was not correctly charged with oil, or where additional coils have been added and no allowances made in the oil supply, or where the connecting lines are in excess of the recommended length, or where the oil or a part of the oil is trapped either in the coil or in the return line, or where a portion of the oil has been actually decomposed by the presence of air and moisture in the system. Thus before adding additional oil to a compressor, ascertain the cause for the shortage and make the necessary corrections. Care should be taken to select the correct oil for the refrigerant in question, and remember that any oil used in the system *must be free from moisture and all other foreign particles.*

PROCEDURE:

A. Attach the combination gauge set, purge the lines, and test the connections for leaks.

B. Put the compressor into operation, and check the head and back pressures. Make a note of the pressures and check with instructor. Stop the compressor.

C. Close the discharge shut-off valve on the compressor all the way to the left. This is to prevent a slug of oil that might be sent up through the compressor from breaking the gauge.

D. Attach a ¼-inch line to the service connection on the combination gauge set. Be sure the line is clean and dry.

E. Pour about 1 pint of oil into a clean, dry glass bottle or jar.

F. Purge the ¼-inch oil charging line that is connected to the gauge set, then put open end of the oil line into the oil, and make sure that the end of the tube is touching the bottom of the bottle.

G. Close suction line shut-off valve on compressor all the way to the right and run compressor long enough to draw a 20-inch vacuum on the compound gauge, then stop the compressor.

H. Open the service valve on the combination gauge set into which the combination gauge is screwed with the box wrench. The oil will be drawn from the glass container. Leave valve open just long enough to draw one-half the oil out of the container, then close valve tightly. Leave the oil line in the oil container.

I. Open the suction line shut-off valve on the compressor to its normal operating position, and put compressor into operation. Call the instructor for an inspection at this point.

J. After the compressor has operated for several minutes, the discharge shut-off valve may be cracked open (to the right) so that the pressure gauge will register.

K. Remove the oil charging line, letting the residue oil drain back into the oil container. Dispose of the remaining oil in the container as it should not be poured back into the oil can.

L. Check with instructor.

Note: It is recommended that oil be added in small amounts, the same as the refrigerant as an overcharge of oil will cause considerable damage to the system.

# SERVICE

# How to Adjust and Repair Ranco Thermostats

By J. D. Merkle, Automatic Reclosing Circuit Breaker Co.

These instructions cover the adjustment and servicing of standard styles of Ranco thermostats. Special styles have similar adjustments which may easily be determined by following the instructions given.

The instructions, except for the general data, are arranged in accordance with the order in which the different types of Rancostats were developed, as follows: type "R," type "RA" and "RD," type "D," type "F," type "FF," and type "KR." If the instructions given are insufficient to obtain satisfactory operation of a thermostat, it should be shipped to the factory.

## General Instructions

### Overload Coil Selection

Ranco does not specify overload coil ratings for various motors. The motor manufacturer determines the load that his motor will safely carry and recommends overload coil ratings accordingly.

### Overload Device

All overloads on Rancostats are the solder well type, and after the functioning of the overload, it is necessary to allow several minutes for the solder to cool and set before reclosing the manual switch on the thermostat.

### Mounting

The control bulb must be firmly tightened midway in the clamp, otherwise erratic operation may be expected due to the varying heat transfer from the chilling unit to the bulb.

All operating temperatures are the temperatures at the mounting clamp (coldest point of the power element) and have no bearing on food chamber temperatures.

Do not permit any portion of the bellows assembly (power element) to touch any part of the evaporator which is colder than the point at which the bulb is clamped.

### Temperature Settings

Factory settings are made to the customer's specifications.

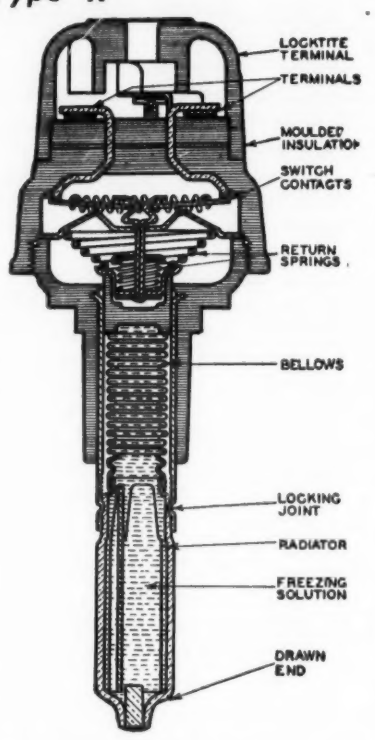
### Altitude and Barometric Pressure

The operating range of the thermostat is affected by changes of atmospheric pressures. The factory settings are made with the proper corrections for a 29.1 in. barometer, which is the average for a 900 ft. altitude.

When the refrigerator is operated at other altitudes or when the barometer reading is different there is a different atmospheric pressure for the bellows to operate against, resulting in the thermostat operating at slightly different temperatures. It is not necessary to make any changes in the adjustment from the regular factory settings for less than a 2,000 ft. altitude. Above this it is advisable to set the control .8° warmer for each 1,000 ft. additional elevation.



## Type 'R'




Features — temperature switch. Operating Means—freezing solution in bellows. Horsepower Rating—¼ hp. 110 or 220 volts a.c., ⅛ hp. 115 volts d.c. Application—domestic refrigerators.

This type is non-adjustable.

### Operating Range

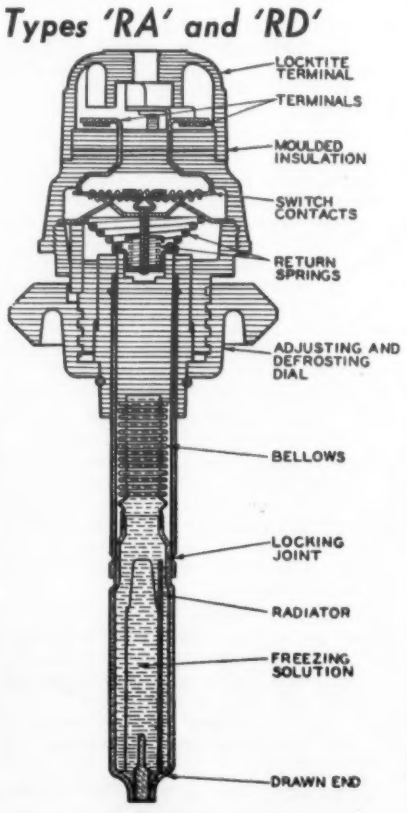
The operating range is determined by the solution with which the bellows and bulb (power element) is filled. The various solutions are identified by type numbers as per the following chart:

| *Type* | *Off °F.* | *On °F.* |
|---|---|---|
| R-0 | 28 | 33 |
| R-2 | 27.5 | 32 |
| R-3 | 27 | 30.5 |
| R-5 | 25 | 29 |
| R-6 | 24 | 28 |
| R-8 | 23 | 27 |
| R-10 | 20 | 26 |
| R-12 | 17.5 | 24 |
| R-16 | 14 | 21 |

### Power Element

When the power element loses its charge it is necessary to make a general repair of the complete thermostat. (It is insufficient to replace the power element only.) This repair work may be done only at the factory where there are proper facilities for disassembly and reassembly, skilled adjustment, and exact replacement parts.

## Types 'RA' and 'RD'




Type "RD" Thermostat.

Features—temperature switch, dial control, manual switch on some RD's. Operating means—freezing solution in bellows. Horsepower Rating—¼ hp. 110 or 220 volts a.c., ⅛ hp. 115 volts d.c. Application—domestic refrigerators.

### Adjustments

Number 1 dial position is the warmest setting and number 5 is the coldest setting.

On some type RD models the dial may be turned beyond point number 1 to a cut-off position. After cutting out, the dial must be turned back toward point number 1 to the cut-on position, to start the motor.

There is no further adjustment.

The operating range is determined by the solution with which the bellows and bulb (power element) is filled. The various solutions are identified by type numbers. Note the following chart:

| *Type* | | *Off °F.* | *On °F.* |
|---|---|---|---|
| RA-3 or RD-3 | Point 1 | 27 | 30.5 |
| | Point 5 | 22 | 29 |
| RA-5 or RD-5 | Point 1 | 25 | 29 |
| | Point 5 | 20 | 27 |
| RA-6 or RD-6 | Point 1 | 24 | 28 |
| | Point 5 | 18.5 | 25.5 |
| RA-8 or RD-8 | Point 1 | 23 | 27 |
| | Point 5 | 16 | 24 |
| RA-10 or RD-10 | Point 1 | 20 | 26 |
| | Point 5 | 13 | 23 |
| RA-12 or RD-12 | Point 1 | 17.5 | 24 |
| | Point 5 | 6.5 | 20 |
| RA-16 or RD-16 | Point 1 | 14 | 21 |
| | Point 5 | 4.5 | 18 |

## Type 'D'

Features—temperature or pressure switch, dial control (optional), overload (optional), manual switch. Operating Means—gas filled bellows. Horsepower Rating—1 hp. 110 or 220 volts a.c., ½ hp. 115 volts d.c. Application—domestic refrigerators, ice cream cabinets, water coolers.

### Adjustments

Range adjustment is made by adjusting range adjusting screw, with the temperature control dial "A." *Left to raise—right to lower.* The temperature control dial adjustment between the extreme ends of the dial (point 1 to point 8) is approximately 10° F. on a household refrigerator installation and about 6° F. on a water cooler installation.

For further adjustment observe the position of the temperature control dial pointer "A." Remove screw "B." Take off dial pointer "A" and put it on again with the pointer either to the right or left of the original position. The range will be changed by this relocation of the dial pointer. *Right to raise—left to lower.* Replace screw "B."

Differential adjustment is made by adjusting differential adjusting screw "D." *Right to raise—left to lower.* Remove screw "B" and adjust screw "D" with a narrow blade screw driver. Each complete turn of screw "D" changes the differential about 4° F. When the tension is entirely removed from the differential spring "E" no further reduction in differential can be made.

Turning the differential screw does not affect the cut-out temperature setting. It changes the cut-in setting only.

### Changing Overload Coil

Overload coil "F" is located under the overload cover which is held in place with one screw.

The coil is tagged with its current rating in amperes. (The overload coils for the type "D" Rancostat were designed to carry the rated current continuously.)

Only two screws hold the coil in place on the thermostat. All ratings of the overload coil are interchangeable.

It is necessary that the new coil be properly centered on the overload ratchet shaft.

### Power Element

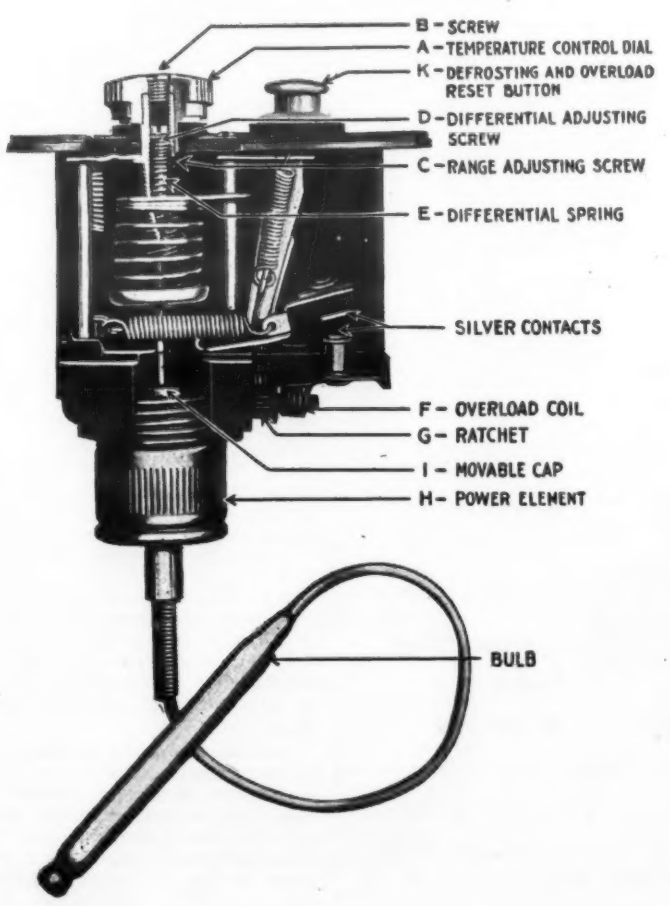
When power element "H" loses its charge, replacement of the power element is necessary.

It is important that the power element be screwed firmly in place, by hand, but not with a wrench.

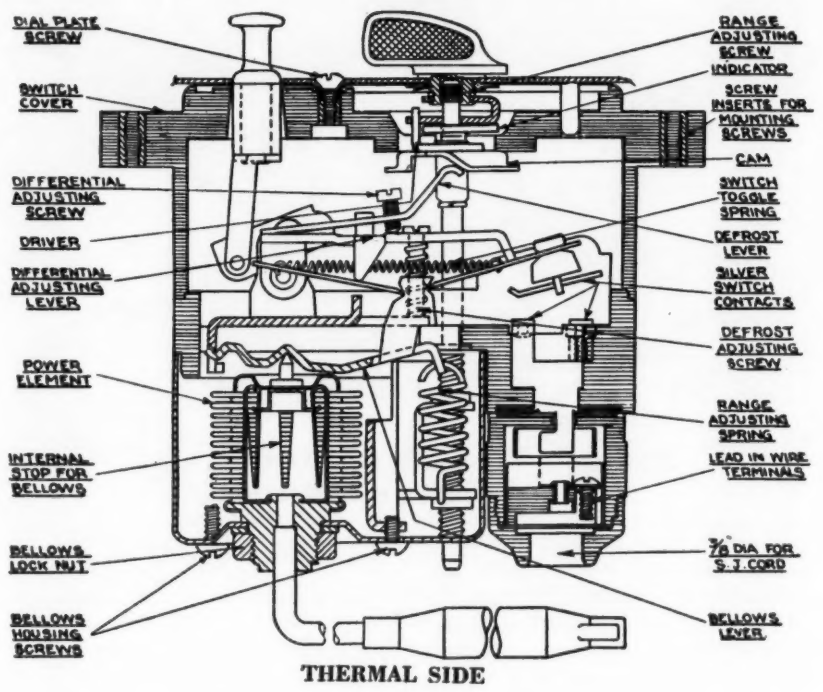
When screwing the power element up against the push rod, after the contacts have snapped closed, no less than one-eighth turn nor more than one-quarter turn should be required to firmly tighten the power element. The following spacers are available for regulation of space. They fit all type "D" Rancostats.

Cat. 8389—.010 inch thick.
Cat. 8393—.020 inch thick.
Cat. 8394—.032 inch thick.

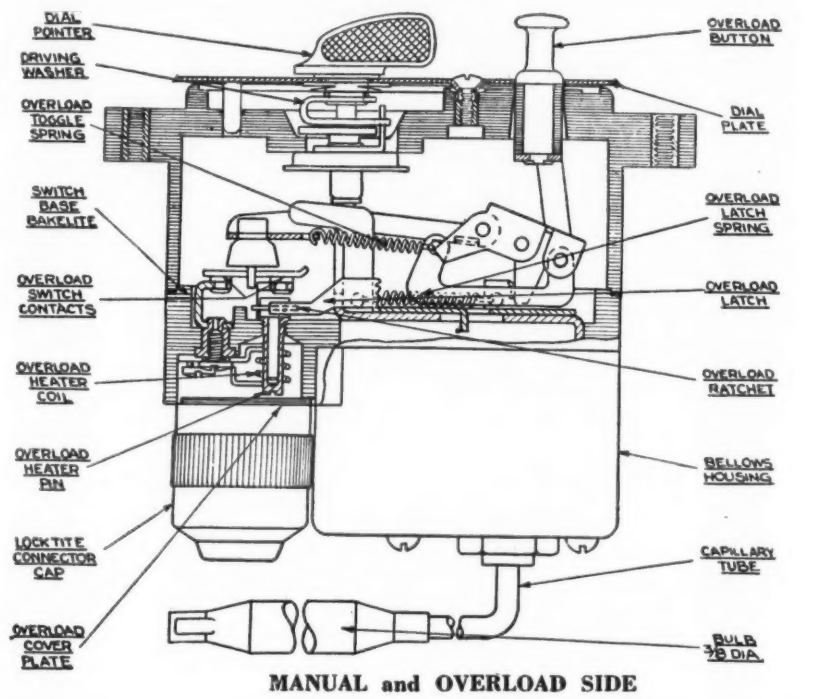
## Type 'D' Thermostat




## Ranco Type 'F'




THERMAL SIDE




MANUAL and OVERLOAD SIDE

## Type 'F'

Features—temperature or pressure switch, dial control (optional), overload (optional), semi-automatic defrost (optional), wide cycle defrost (optional), manual switch. Operating Means—gas filled bellows. Horsepower Rating—½ hp. 110 or 220 volts a.c. ¼ hp. 115 volts d.c. Application—domestic refrigerators, ice cream cabinets, water coolers.

### Adjustments

Range adjustment is made by adjusting range adjusting screw, with the dial pointer, *left to raise—right to lower.*

If the range adjustment within the limits of the dial pointer is insufficient, for further adjustment, turn the dial pointer to the normal position (mid point of the dial.) Remove the dial plate screw and then the dial plate with the attached pointer. (If no previous adjustment has been made, the service indicator will point in the same direction as did the dial

*(Continued on Page 13, Column 1)*

# Methods of Setting Ranco Thermostats

(*Continued from Page 12, Column 5*)

pointer. The indicator at the factory setting always points opposite the cam driver.) Replace the dial plate with the pointer in a new position either to the right or left of the normal position from which it was removed. The range will be changed by this relocation of the dial pointer. *Right to raise—left to lower.*

If the dial pointer is now turned to normal and dial plate and pointer removed, the service indicator will show the angle that the range screw has been turned from previous normal. The wide cycle defrost position is at the left end of the dial.

### Differential Adjustment

The differential adjusting screw was soldered after the switch was set at the factory. If it is found advisable to unsolder this screw for adjustment, it should be resoldered. Turn the screw *left to increase—right to decrease.* Turning the differential adjusting screw changes the cut-in point only.

Defrost adjustment is a separate operation and should not require any correction in the field. If necessary an adjustment may be made with a screw which is under a hole in the cam near the adjusting screw. This screw can be seen only when the dial pointer is removed when in the defrost position. Turn the defrost adjustment screw. *Left to raise—right to lower.*

### Changing Overload Coil

The overload heater coil is located under the locktite cap and overload cover plate. The coil is tagged with its part number and current rating in amperes. (The overload coils for the type "F" Rancostat were designed to carry the rated current continuously.) Only two screws hold the coil in place on the thermostat. All ratings of the overload coil are interchangeable. It is necessary that the new coil be properly centered on the overload ratchet shaft.

When the power element loses its charge, replacement of the power element is necessary.

## Type 'FF'

Features—temperature switch, dial control, overload (optional), semi-automatic defrost (optional), semi-automatic fast freeze (optional), manual switch. Operating Means—gas filled bellows. Horsepower Rating—½ hp. 110 or 220 volts a.c., ¼ hp. 115 volts d.c. Application—domestic refrigerators.

### Minor Changes of Temperature Settings

All operating temperatures are changed by turning adjusting screw (32) *right to raise—left to lower.*

For dial temperatures only (without disturbing fast freeze or defrost operation) remove attaching screw (15) lift off dial pointer (14) turn service indicator (17) and the range screw (16) on which it is mounted. *Left to raise—right to lower.*

Replace the dial pointer in the normal position. Note that the point of the service indicator and the arrow of the dial pointer occupy the same relative position, at the original factory settings. Any subsequent change will be shown by comparison of the positions of these points.

### Adjustments

Adjustments are accessible with the cover (9) removed. The cover is held in place by one screw located under the overload cover and one diagonally opposite passing through the bellows cover (1).

The service indicator (17) is held in place on the range screw (16) by a steel ring, which can be removed with a small pointed tool.

All adjustments must be made in the following order as any change made in one may vary the action of an adjustment listed later in the sequence.

Range spring pick up adjustment (19) must be set so that the link (29) permits the full use of the range spring (30) on both "in" and "out" action of the switch with the fast freeze and defrost lever (18) and roller (22) in the normal position, but lifts the range spring (30) entirely out of action when the roller (22) and lever (18) are in either the fast freeze or defrost position.

Fast freeze adjustment (32). The fast freeze out may only be adjusted with the roller (22) in the fast freeze position. Turning the adjustment to the *right* raises and to the *left* lowers the temperature at which the switch opens. When the roller (22) is in the fast freeze position the pawl (21) is outside the arm on the end of the bellows lever (26). When the switch opens, the pawl (21) slips over the arm and as the bellows lever (26) raises, it engages the pawl (21) and returns the roller (22) to the normal position before the switch contacts close.

Normal "off" adjustment. Turn the range screw (16) to the *right* to lower or to the *left* to raise the "off" temperature. Be sure that the economy arm (25) does not touch the bellows lever (26) during the operation of the switch.

Normal "on" adjustment. With the cam (23) turned so that it is lifting the economy arm (25) out of action, turn the differential screw (4) to the *right* to lower or to the *left* to raise the "on" temperature. This does not change the cut-out adjustment.

Economy arm pick up. With the cam (23) turned so that the flat segment permits the functioning of the economy arm (25), set the adjustment (24) so that this lever is in use on the "in" action but not on the "out." When the economy arm (25) is lifted by the raised segment of the cam (23) it must not touch the bellows lever (26) at any time during the operation of the switch.

Defrost arm pick up (24). (This adjustment is omitted on later model thermostats.) The washer between this adjustment (6) and the defrost arm (7) must be free to move at a slight touch, but close enough to prevent lost motion, when the roller (22) is in the defrost position. The end of the defrost arm (7) must not touch the roller (22) when the latter is in the normal position.

Economy "on." Turn the range screw (16) and the cam driver (13) with the dial pointer (14) so that the dial pointer is in the economy position. Turn the economy adjustment (10) to the *right* to raise or to the *left* to lower the "on" temperature, then turn the dial pointer to the normal position. The economy arm (25) is used to raise the "on" action of the switch but does not affect the "off" action.

Defrost "on." With the roller (22) in the defrost position adjust the defrost adjustment (11): turn to the *right* to raise or to the *left* to lower the setting. The roller (22) returns to the normal position as the switch closes.

All operating temperatures should be checked for accuracy after the cover has been replaced on the thermostat.

### Changing Overload Coil

The overload heater coil is located under the locktite cap and overload cover plate.

The coil is tagged with its part number and current rating in amperes. (Overload coils for type "FF" Rancostats were designed to ultimately trip open the switch when carrying rated current in a room temperature of 104° F., 40° C.) Only two screws hold the coil in place on the thermostat. All ratings of the overload coil are interchangeable. The overload coils are self-centered when mounted, eliminating the necessity for positioning a coil after mounting. (This also applies to type "KR" thermostats.)

When the power element loses its charge, replacement of the power element is necessary. (This also applies to type "KR" models.

## Type 'KR'

Features—temperature or pressure switch, dial control (optional), dial defrost (optional), overload (optional), semi-automatic defrost (optional), cold stop (optional), manual switch (optional). Operating Means—gas filled bellows. Horsepower Rating—½ hp. 110 or 220 volts a.c. Application—domestic refrigerators, ice cream cabinets, water coolers.

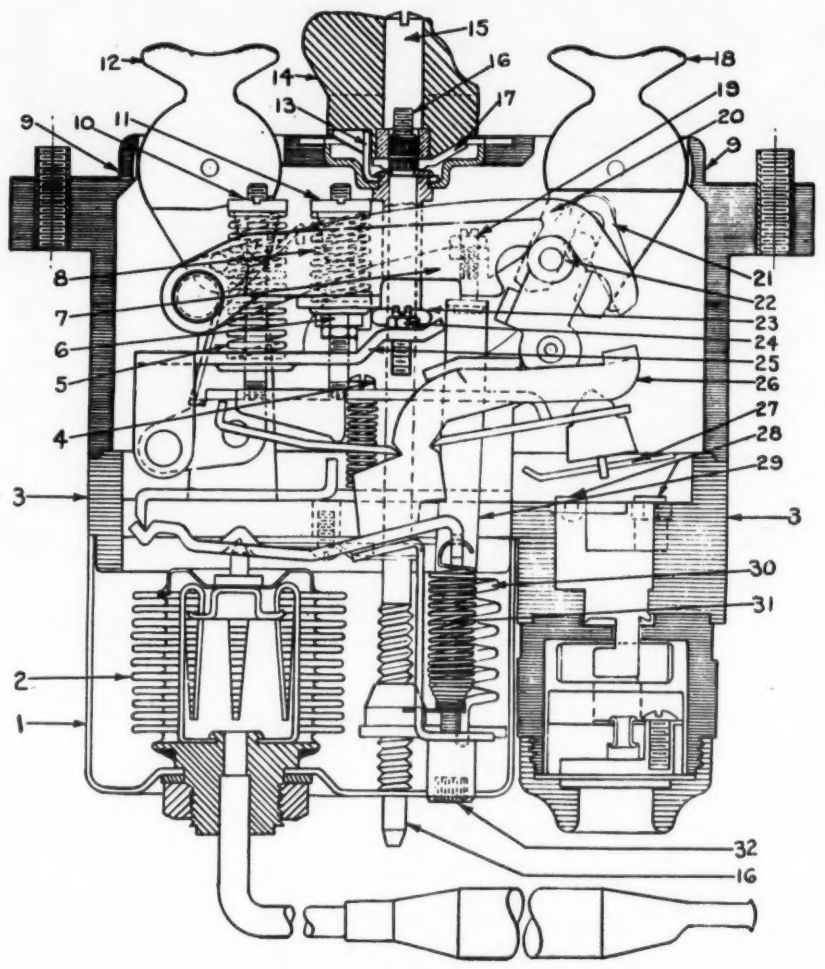
### Adjustments

Range adjustment is made by adjusting the cam with the dial pointer, *left to raise—right to lower.* The dial defrost position of the dial pointer is at the extreme left end of the dial.

Changing the dial pointer position does not change the differential.

(*Concluded on Page 14, Column 3*)

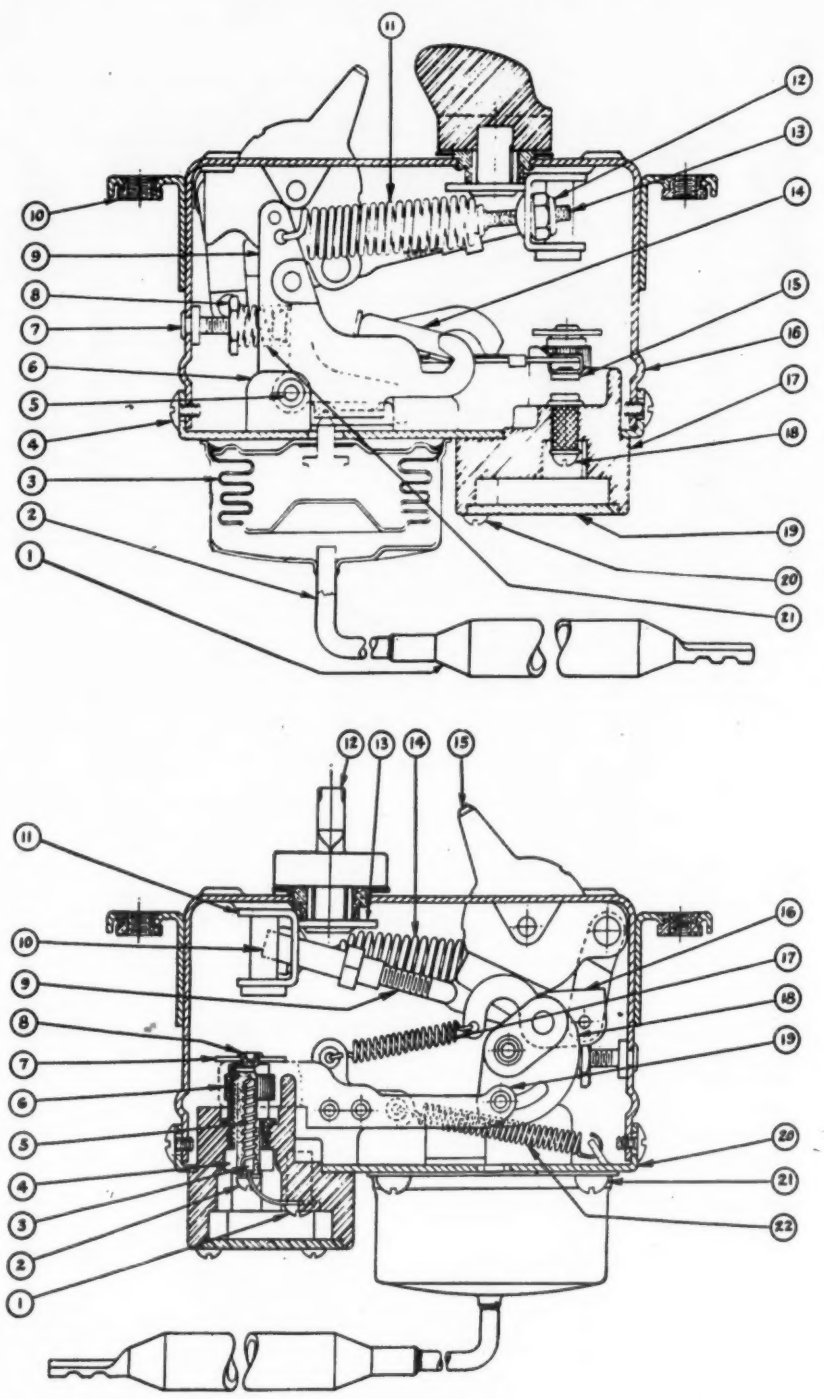
## Type 'FF' Ranco Control




The numerical key to Ranco's type "FF" thermostat is given below:

1. Bellows Cover
2. Bellows
3. Base
4. Normal Cut-in Adjustment (Differential Screw)
5. Economy Spring
6. Defrost Arm Pick Up Adjustment
7. Defrost Arm
8. Defrost Spring
9. Cover
10. Economy Adjustment
11. Defrost Adjustment
12. Overload and Manual Switch Lever
13. Cam Driver
14. Dial Pointer
15. Attaching Screw
16. Range Screw (Cut Off Adjustment)
17. Service Indicator
18. Fast Freeze and Defrost Lever
19. Range Spring Pick Up Adjustment
20. Range Arm
21. Fast Freeze Pawl
22. Roller
23. Cam
24. Economy Pick Up Adjustment
25. Economy Arm
26. Bellows Lever
27. Contact Bar
28. Contacts
29. Link
30. Range Spring
31. Fast Freeze Spring
32. Fast Freeze Adjustment

## 'KR' Type Control



Cross section of the right-hand side of Ranco's "KR" control is shown in the upper drawing and the left-hand side is shown below.

## Service Data on 'KR' Ranco Thermostats

*(Concluded from Page 13, Column 3)*

The change in range for full dial adjustment is determined by both the shape of the adjusting cam and the cold stop.

The cold stop is a feature of some KR Rancostats, which prevents the operating range (for a certain setting of the range spring tension) from going below a predetermined point even though the dial pointer is turned to the extreme cold position.

For further adjustment on KRS (service models) turn the service indicator located on the dial end of the Rancostat *right to raise—left to lower* the operating range. This adjustment changes the operating temperatures for all dial pointer positions approximately 8° F. from the extreme "cold" position to the extreme "warm" position.

For additional adjustment on all "KR" Rancostats when facing the front of the Rancostat with the dial pointer at the bottom, the range spring is on the left-hand side, remove the left-hand side cover plate. Turn the range adjusting nut *right to raise—left to lower* the operating range approximately 1.5° F. for each complete turn.

For differential adjustment on KRS (service models) turn the differential adjusting screw located on the manual switch end of the Rancostat. *Left to increase—right to decrease* the differential.

On all other Rancostat models having differential adjustment. (When facing the front of the Rancostat with the dial pointer at the bottom, the differential spring is on the left-hand side.) Remove the left-hand cover plate, turn the differential adjusting nut *left to increase—right to decrease* the differential.

Note: changing the differential adjustment does not change the cut-out temperature setting. It changes the cut-in setting only.

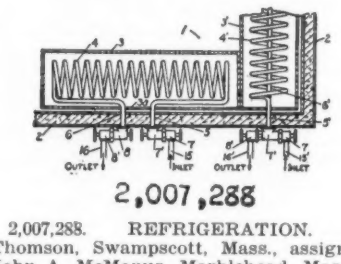
The above adjustments also apply to thermostats having semi-automatic defrost.

To adjust defrost cut-in temperature setting: when facing front of Rancostat with dial pointer at bottom remove the right-hand cover plate and adjust long hexagonal nut *left to raise—right to lower* the cut-in temperature setting.

Changing the dial pointer position does not disturb the semi-automatic defrost setting.

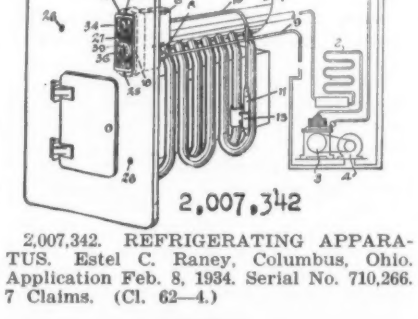
# PATENTS

## Issued July 9, 1935



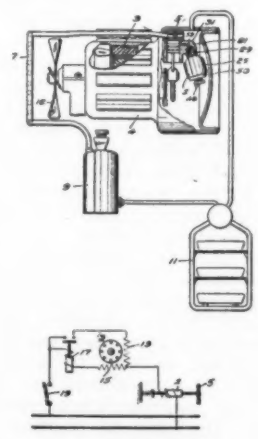

2,007,288

2,007,288. REFRIGERATION. Elihu Thomson, Swampscott, Mass., assignor to John A. McManus, Marblehead, Mass. Application Dec. 3, 1932. Serial No. 645,591. 9 Claims. (Cl. 62—95.)



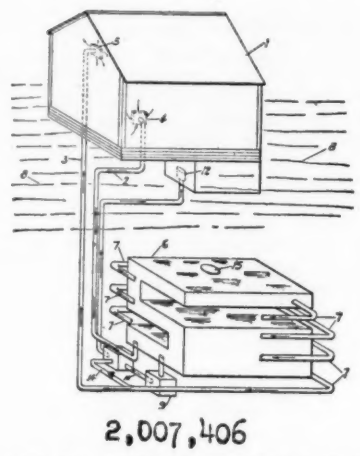
2,007,342

2,007,342. REFRIGERATING APPARATUS. Estel C. Raney, Columbus, Ohio. Application Feb. 8, 1934. Serial No. 710,266. 7 Claims. (Cl. 62—4.)



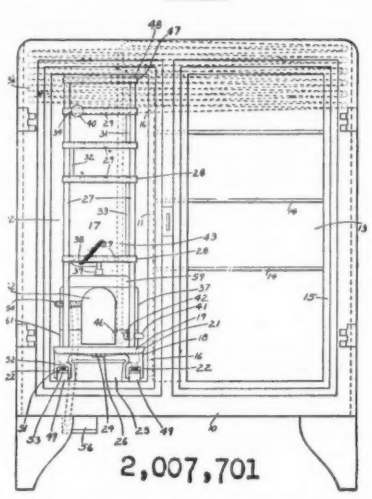
2,007,388

2,007,388. VALVE CONSTRUCTION. Frederic L. Tarleton, Springfield, Mass., assignor to Westinghouse Electric & Mfg Co., a corporation of Pennsylvania. Application Sept. 15, 1931. Serial No. 562,882. 14 Claims. (Cl. 230—22.)



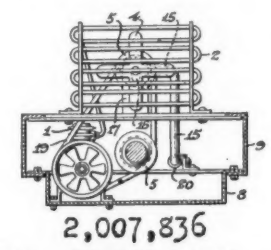
2,007,406

2,007,406. APPARATUS FOR COOLING AIR. Royal V. Miller, Tulsa, Okla. Application Aug. 15, 1934. Serial No. 739,954. 1 Claim. (Cl. 257—121.)



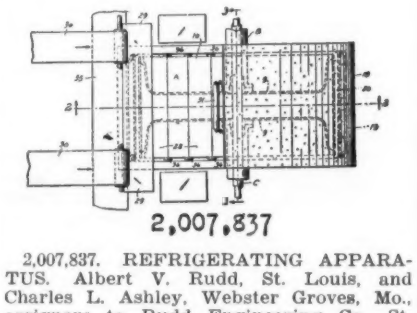
2,007,701

2,007,701. REFRIGERATING SYSTEM. Vincent G. Apple, Dayton, Ohio; Herbert F. Apple, Edward M. Apple, and Gourley Darroch executors of said Vincent G. Apple, deceased. Application Feb. 19, 1931. Serial No. 516,967. 8 Claims. (Cl. 62—116.)



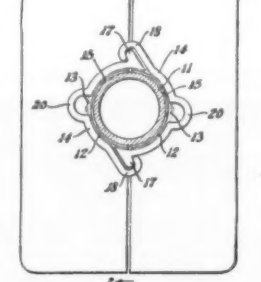
2,007,836

2,007,836. REFRIGERATOR TRUCK COOLING APPARATUS. Herbert Roberts, Chicago, Ill., assignor of one-half to Maurice Wiseman, Pittsburgh, Pa. Application Nov. 1, 1934. Serial No. 751,040. 1 Claim. (Cl. 62—117.)



2,007,837

2,007,837. REFRIGERATING APPARATUS. Albert V. Rudd, St. Louis, and Charles L. Ashley, Webster Groves, Mo., assignors to Rudd Engineering Co., St. Louis, Mo., a corporation of Missouri. Application April 18, 1930. Serial No. 445,368. 20 Claims. (Cl. 62—114.)



2,007,838

2,007,838. HEAT TRANSFER APPARATUS. Roy J. Scott and Lloyd E. Scott, Canton, Ohio. Application Nov. 8, 1934. Serial No. 752,072. 8 Claims. (Cl. 257—263.)

## May Co. Forms Basement Refrigerator Dept.

BALTIMORE—A Kelvinator refrigerator department has been established in the basement store of The May Co., local department store. The regular refrigerator department, featuring other makes of refrigerators, is located on the fifth floor of the store.

All refrigerator operations are under the supervision of Ralph R. Olswang, refrigerator merchandising manager and buyer at The May Co.

## Group Subscription Rates

**The following special rates are for PAID-IN-ADVANCE subscriptions only in the United States and Possessions and Pan-American Postal Union Countries. Charge orders are billed at the single-subscription rate, regardless of number. Papers will be mailed to individual addresses.**

| | Electric Refrigeration News (weekly) | 1935 Refrigeration Directory and Market Data Book (2 volumes) | Both Electric Refrigeration News and Refrigeration Directory |
|---|---|---|---|
| 1 subscription | $3.00 | $5.00 | $6.50 |
| 5 or more each | 2.75 | 4.50 | 6.50 |
| 10 or more each | 2.50 | 4.00 | 6.50 |
| 20 or more each | 2.25 | 3.50 | 5.75 |
| 50 or more each | 2.00 | 3.00 | 5.00 |
| 75 or more each | 1.75 | 2.50 | 4.25 |
| 100 or more each | 1.50 | 2.00 | 3.50 |
| **For All Other Countries (Except Canada)** | | | |
| 1 subscription | $5.00 | $6.00 | $9.00 |
| 5 or more each | 4.75 | 5.50 | 8.50 |
| 10 or more each | 4.50 | 5.00 | 8.00 |
| 20 or more each | 4.25 | 4.50 | 7.50 |
| 50 or more each | 4.00 | 4.00 | 7.00 |
| **Canadian Rates (including tariff of 5 cents per copy on the News)** | | | |
| 1 subscription | $6.00 | $6.00* | $11.00* |
| 5 or more each | 5.75 | 5.50* | 10.50* |
| 10 or more each | 5.50 | 5.00* | 10.00* |
| 20 or more each | 5.25 | 4.50* | 9.50* |
| 50 or more each | 5.00 | 4.00* | 9.00* |

*Canadian subscribers are required to pay a tariff and excise tax on the Directory and Market Data Book which amounts to $2.59. These extra charges on books will be collected by the Canadian postoffice at the time of delivery.

## Subscription Order

Business News Publishing Co.
5229 Cass Ave., Detroit, Mich. Date.....

☐ Enter my subscription to Electric Refrigeration News for one year (52 issues).
☐ Send the 1935 Refrigeration Directory and Market Data Book (2 volumes).
☐ Enclosed find remittance. (See rates above.)

Name .....

Attention of
In Care of .....

Street Address .....City and State.....

We sell the .....refrigerator and .....
(Please indicate other products or principal line of business.)
7-24-35

# QUESTIONS

## Address of Sunbeam

*No. 2359* (Manufacturer, New York)—"Please give us address of the Sunbeam Electric Co."

*Answer*: 225 W. Morgan St., Evansville, Ind.

## Absorption Systems

*No. 2360* (Dealer, New Jersey)—"I was advised by the John C. Winston Co. of Philadelphia, Pa. to communicate with you regarding drawings and specifications for absorption refrigerating systems, also the gas-fired Electrolux?

"Will you please advise me what is necessary to get this information?"

*Answer*: A story about Electrolux air cooled refrigeration system was published in the March 29, 1933, issue of Electric Refrigeration News. Our stock of these issues is exhausted, but you might find it in the files of the public library.

An article by B. H. Jennings of Lehigh University on "New Data on Absorption Refrigeration" was published on page 17 of the May 29, 1935 issue of Electric Refrigeration News.

## Streamlined Faucet

*No. 2361* (Dealer, Illinois) "We are desirous of learning who is the manufacturer of the new stream line faucet that is similar to the faucet manufactured at the present time by the Russ Manufacturing Co."

*Answer*: Manufacturers of faucets for beer and beverage coolers are listed on pages 170 and 171 of the 1935 Refrigeration and Air Conditioning Directory.

## Soft Rubber Hose

*No. 2362* (Dealer, Wisconsin)—"Could you please send us the name of the place where we can buy soft rubber hose for insulating suction lines."

*Answer*: The following companies manufacture a rubber material for insulating suction lines:

Dayton Rubber Co.
1014 S. Kildore Ave., Chicago, Ill.
Miller Rubber Products Co.
S. High St., Akron, Ohio.

## Hardware Manufacturers

*No. 2363* (Dealer, Italy)—"I shall be very much obliged if you can arrange to have some manufacturers send me catalogs and prices on modern hardware for electric refrigerators."

*Answer*: See below.

*No. 2364* (Manufacturer, New Zealand)—"Would you be kind enough to send us samples of attractive hinges and door catches for our guidance?"

*Answer*: Some manufacturers of hardware for household electric refrigerators are as follows:

Arcade Mfg. Co.
1212 E. Shawnee St., Freesport, Ill.
Grand Rapids Brass Co.
90 Scribner Ave., N. W.,
Grand Rapids, Mich.
Kason Hardware Corp.
127 Wallabout St., Brooklyn, N. Y.
National Lock Co.
7th St. & 18th Ave., Rockford, Ill.
Winters & Crampton Corp.
Grandville, Mich.

## Domestic Sales

*No. 2365* (Syndicate Service, Illinois)—"Can you supply me the figures showing month to month or quarterly variations in the sales of domestic electrical refrigerators from 1929 up to any recent date? If so, I should appreciate receiving a copy."

*Answer*: Monthly sales of household electric refrigerators are shown in both tabular and chart form in the 1935 Refrigeration and Air Conditioning Market Data Book which contains all available industry statistics. The figures show the monthly sales trend from January, 1930 through December, 1934, and represent sales by industry manufacturers to distributors and dealers.

## Thermocraft Insulation

*No. 2366* (Reader, Virginia)—"Of what is Thermocraft made?"

*Answer*: For information on Thermocraft insulation write Hinde & Dauche Paper Co., 306 Decatur St., Sandusky, Ohio.

## Bardes Stoker

*No. 2367* (Distributor, Alabama)—"Kindly furnish us with the name of the manufacturer of the Bardes Automatic Stoker. We have a folder from these people on their stoker and are interested but their mailing piece carries no firm name or address. We will appreciate your obtaining this information for us if available at your earliest possible convenience."

*Answer*: Try E. H. Bardes Co., 2619 Colerain Ave., in Cincinnati, Ohio.

## Water Cooler Sales

*No. 2368* (Service Company, Illinois)—"We are interested in obtaining definite statistical information relative to the water cooler sales in this country for the last 12 month period, ending with May, 1935.

"We would appreciate information and detail relative to the number of units sold by the various companies, the model classification and list prices gotten up in the same manner as the statistical report on the ice boxes as listed in your issue of June 12. We are desirous of obtaining this information at the earliest opportunity and would appreciate your immediate consideration in getting it to us."

*Answer*: Monthly sales of water coolers from June, 1934 through May, 1935 are listed below. These sales were reported by the Refrigeration Division of the National Electrical Manufacturers Association and represent shipments by manufacturers to distributors and dealers in the United States only. Both self-contained and remote water coolers are included. Sales are as follows:

| | |
|---|---|
| June, 1934 | 2,269 |
| July, 1934 | 2,368 |
| August, 1934 | 1,798 |
| September, 1934 | 1,079 |
| October, 1934 | 862 |
| November, 1934 | 598 |
| December, 1934 | 277 |
| January, 1935 | 610 |
| February, 1935 | 630 |
| March, 1935 | 1,121 |
| April, 1935 | 1,510 |
| May, 1935 | 2,061 |

We have not published detailed specifications covering water coolers such as would show classification by models and list prices.

## Refrigeration Handbook

*No. 2369* (Dealer, Kansas)—"I would like to know the price of the American Society of Refrigeration handbook for 1935."

*Answer*: The American Society of Refrigerating Engineers, 37 W. 39th St., New York City, publishes the Refrigerating Data Book, giving technical and engineering data on refrigeration, and selling for $3.50 per copy.

## Monthly Production

*No. 2370* (Manufacturer, Illinois)—"I want to obtain figures on total household refrigerator production month by month for the present year. Although you have abandoned publication of these figures, I assume they are still available. If you do not have them, can you tell me where we can get the information."

*Answer*: Figures on the production of household electric refrigerators are not being issued by the Refrigeration Division of the National Electrical Manufacturers Association this year. These figures were given out in 1934 only.

## Service Men in South

*No. 2371* (Manufacturer, Florida)—"We are interested in locating a list of refrigeration repair shops, refrigeration distributors, dealers, and agents in the state of Florida and Georgia.

"We understand that you have such a list and we will appreciate you sending us a copy."

*Answer*: A list of refrigeration service companies is published in the 1935 Refrigeration and Air Conditioning Directory. We do not have a list of refrigeration distributors and dealers.

## Counter-Type Freezer

*No. 2372* (Trading Company, Holland)—"We would be very much obliged to you, if you could give us the following information with regard to a special machine.

"It seems that a motor company is manufacturing a machine making cream-ice without the use of any raw ice for cooling.

"It is a unit consisting of a small compressor installation (General Electric) for the cooling of the cylinder which is being used for the producing of cream-ice in ready made portions.

"This firm is established in your town and it would be highly interesting to know whether this particular machine is a novelty and as to whether the said firm would be willing to give the selling license for Europe in our hands.

"Is there any other factory in the United States, making a similar machine?

"Another thing which is very interesting for us, is an automat for cream-ice in portions. Are such automats well known in the U. S. and could you give us the addresses of some makers?

"We would be extremely obliged to you, when you could recommend us a periodic dealing with novelties, connected with cream-ice and cream making."

*Answer*: We believe you have reference to a counter-type ice cream freezer, which is finding considerable use in this country. Manufacturers of counter freezers are listed on page 203 of the 1935 Refrigeration and Air Conditioning Directory.

## Sales for May & June

*No. 2373* (Advertising Agency, Illinois)—"Please send us domestic refrigerator sales for May and June, 1934 and 1935, in units and dollars."

*Answer*: Refrigerator sales by units are as follows: May, 1934, 268,600; May, 1935, 261,100; June, 1934, 187,600. No figures have been reported yet for June, 1935. Value in dollars for refrigerator sales has not been reported. Sales figures given are by manufacturers to distributors.

# CLASSIFIED

RATES: Fifty words or less, one insertion $2.00, additional words four cents each. Three insertions $5.00, additional words ten cents each.

PAYMENT in advance is required for advertising in this column.

REPLIES to advertisements with Box No. should be addressed to Electric Refrigeration News, 5229 Cass Ave., Detroit, Mich.

### FRANCHISE AVAILABLE

DISTRIBUTORS, DEALERS, to sell retail our nationally advertised brand new and A-1 reconditioned, remanufactured refrigerators. Exclusive territories open for domestic and export trade. Hundreds of refrigerators on hand at greatly reduced prices. Every one bears our guarantee. Write for booklet containing specifications and prices for domestic and export trade. When buying reconditioned refrigerators look for our label, "Remanufactured by Federal Refrigerator Corp., 435 11th Ave., New York."

### EQUIPMENT FOR SALE

REBUILT Mayson expansion valves, $1.00. Rebuilt American Radiator expansion valves, $1.65. Ranco controls, all types, $1.95. Frigidaire and Kelvinator dry and flooded coils, $1.50 up. Rebuilt domestic and commercial units, $12.50 up; all sizes from ⅛ HP to 1½ HP; thoroughly rebuilt, fully reconditioned. Federal Refrigerator Corp., 437 11th Ave., New York.

ISOBUTANE: We offer purest and dryest Isobutane for the most exacting scientific purposes; in your 80 lb. cylinders at $0.75, in our 120 lb. cylinders, $0.70, in small lots at $1.00 per pound. The Standard Refrigeration Co. of Pittsburgh, 1148 Dohrman St., McKees Rocks, Pa.

### PATENTS

HAVE YOUR patent work done by a specialist. I have had more than 25 years' experience in refrigeration engineering. Prompt searches and reports. Reasonable fees. H. R. Van Deventer (ASRE), Patent Attorney, 342 Madison Avenue, New York City.

### REPAIRS

HALECTRIC thermostat repair service. B & B, G.E., Cutler-Hammer, Penn, Ranco, Tag., etc. Expansion valves repaired. Gas service, Ethyl, Methyl, Iso-Butane, Sulphur. Your cylinder or ours. Competitive prices. Halectric Laboratory, 1793 Lakeview Road, Cleveland, Ohio.